RECORD OF DECISION

IRON HORSE PARK SUPERFUND SITE

OPERABLE UNIT 4

BILLERICA, MASSACHUSETTS

MIDDLESEX COUNTY

JULY 2011

Prepared by:

United States Environmental Protection Agency
New England Region – Region 1
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DECLARATION FOR THE RECORD OF DECISION

Iron Horse Park
Billerica, Massachusetts
MAD051787323
Operable Unit 4

A. STATEMENT OF BASIS AND PURPOSE

This decision document presents the selected remedial action for the Iron Horse Park Superfund Site, Operable Unit 4 (OU4)(Site), in Billerica, Massachusetts, which was chosen in accordance with the Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERCLA), 42 USC § 9601 *et seq*., as amended by the Superfund Amendments and Reauthorization Act of 1986 (SARA), and, to the extent practicable, the National Oil and Hazardous Substances Pollution Contingency Plan (NCP), 40 CFR Part 300, as amended. The Director of the Office of Site Remediation and Restoration (OSRR) has been delegated the authority to approve this Record of Decision.

This decision was based on the Administrative Record, which has been developed in accordance with Section 113 (k) of CERCLA, and which is available for review at the Billerica Public Library and at the United States Environmental Protection Agency (EPA) Region 1 OSRR Records Center in Boston, Massachusetts. The Administrative Record Index (Appendix E to the ROD) identifies each of the items comprising the Administrative Record upon which the selection of the remedial action is based.

The Commonwealth of Massachusetts concurs with the Selected Remedy

B. ASSESSMENT OF THE SITE

The response action selected in this ROD is necessary to protect the public health or welfare or the environment from actual or threatened releases of hazardous substances into the environment.

C. DESCRIPTION OF THE SELECTED REMEDY

This ROD sets forth the selected remedy for OU4 at the Iron Horse Park Superfund Site, which involves the excavation of contaminated sediments from B&M Pond which exceed ecological risk standards, Monitored Natural Recovery of sediments outside of the B&M Pond area (primarily the Unnamed Brook) which exceed ecological risk standards, and stormwater runoff controls to prevent recontamination of sediments by stormwater runoff draining directly into the B&M Pond and the Unnamed Brook. The selected remedy also involves the establishment of a groundwater compliance boundary and groundwater monitoring to ensure that groundwater that exceeds groundwater performance standards remains within the groundwater compliance boundary. Institutional controls will be implemented to protect the stormwater controls until sediment cleanup levels are achieved, as well as to prevent disturbance of wetlands undergoing MNR. Institutional controls will also be implemented to prevent the use of groundwater within the groundwater compliance boundary.

The remedial measures will ensure that exposure to groundwater within the groundwater compliance boundary is prevented, and that groundwater which exceeds performance standards does not migrate beyond the groundwater compliance boundary. In addition, the remedial measures will ensure that sediments in the B&M Pond and the Unnamed Brook will no longer present an unacceptable environmental risk from direct contact and ingestion of contamination in excess of sediment cleanup levels.

The major components of this remedy are

1. Excavation of about 7,400 cubic yards of B&M Pond contaminated sediment
2. Dewatering, transport and disposal of contaminated sediments (either on or off-site)
3. Treatment (if necessary) and discharge of sediment dewatering fluid and potential stabilization of sediment prior to disposal
4. Wetland mitigation as required
5. Monitored Natural Recovery (MNR) in Unnamed Brook and other unexcavated sediments that exceed sediment cleanup levels
6. Implementing stormwater runoff controls to prevent sediment recontamination
7. Institutional Controls, including at least yearly compliance monitoring, to protect stormwater controls and to prevent disturbance of wetlands undergoing MNR (until sediment cleanup standards are achieved – approximately 20 years)
8. Groundwater monitoring to confirm that contaminants do not migrate beyond the compliance boundary for the Site (including the installation of new wells to supplement the existing monitoring well network)
9. Institutional Controls to prevent use of groundwater on Site and to protect components of the remedy, including at least yearly compliance monitoring
10. Five-year reviews

The total estimated cost of the selected remedy for OU4 is: **$ 5.4 million**

This OU is the fourth at this Site. While part of the same Superfund Site, OU1 (the B&M Wastewater Lagoons) and OU2 (Shaffer Landfill) are distinct areas of the Site.OU3 addressed the remaining source areas at the Site, while OU4 addresses site-wide groundwater, surface water and sediment.

The selected response action addresses low-level threat wastes at the site by: eliminating exposure to ecological receptors from contaminated sediment. This is accomplished through the source control action at B&M Pond and through MNR (over approximately 20 years) at the wetlands outside of B&M Pond. In addition, the source control action will help eliminate the migration of contaminated sediment at B&M Pond, while MNR will progressively eliminate migration of contaminated sediment outside of B&M Pond over the approximately 20 year cleanup period. Long term monitoring/maintenance and institutional controls for groundwater and for sediments being addressed through MNR will ensure that the remedy remains protective in the future. There are no principal threat wastes at OU4.

D. STATUTORY DETERMINATIONS

In accordance with Section 121 of CERCLA, the selected remedy is protective of human health and the environment, complies with Federal and State requirements that are applicable or relevant and appropriate to the remedial action (unless justified by a waiver), is cost-effective, and utilizes permanent solutions and alternative treatment (or resource recovery) technologies to the maximum extent practicable.

The selected remedy does not satisfy the statutory preference for treatment as a principal element. Treatment alternatives for sediment evaluated in the Feasibility Study were not practicable, primarily due to low effectiveness, low cost-effectiveness or low implementability. To the extent there may be some treatment of dewatering fluid or stabilization of sediment before disposal there may be limited satisfaction of the preference for treatment. No treatment alternatives were considered for groundwater because contaminated groundwater occurs solely within the compliance boundary.

Because this remedy will result in hazardous substances remaining on-site above levels that allow for unlimited use and unrestricted exposure (and groundwater and/or land use restrictions are necessary), a review will be conducted within five years after initiation of remedial action to ensure that the remedy continues to provide adequate protection of human health and the environment. Hazardous substances already remain at the Site due to previous actions (OU2 Shaffer Landfill closure). Because of this, the most recent Five-Year Review was completed by EPA in September 2008. The next review will be required by September 2013.

E. SPECIAL FINDINGS

Issuance of this ROD embodies specific determinations made by the Regional Administrator pursuant to CERCLA and section 404 of the Clean Water Act, 33 U.S.C. §1251 *et seq.*, the partial excavation/MNR sediment component of the remedy is the least environmentally damaging practicable alternative for protecting wetland resources at the site under the standards of 40 CFR Part 230. The remedy creates the best balance between the need to destroy wetland resources to remove the most contaminated sediments on Site (and then restore them) and the preservation of less contaminated wetlands, with cleanup standards achieved through MNR. This ROD also includes a finding under the TSCA regulations at 40 C.F.R. 761.61(c) that the PCB sediment cleanup level of 1 mg/kg will not pose an unreasonable risk of injury to health or the environment.

E. ROD DATA CERTIFICATION CHECKLIST

The following information is included in the Decision Summary section of this Record of Decision. Additional information can be found in the Administrative Record file for this site.

1. Chemicals of concern (COCs) and their respective concentrations
   (Section G, Tables)

2. Baseline risk represented by the COCs
   (Section G, Tables)

3. Sediment Cleanup levels and Groundwater Performance Standards established for COCs and the basis for the levels
   (Tables L-1 and L-2)

4. Current and future land and ground-water use assumptions used in the baseline risk assessment and ROD (Section F)

5. Sediment and groundwater use that will be available at the site as a result of the selected remedy (Section L)

6. Estimated capital, operation and maintenance (O&M), and total present worth costs; discount rate; and the number of years over which the remedy cost estimates are projected (Section L)

7. Decisive factor(s) that led to selecting the remedy (Section G, Section M)

F. AUTHORIZING SIGNATURES

This ROD documents the selected remedy for sediment and groundwater at OU4 at the Iron Horse Park Superfund Site. This remedy was selected by the EPA with concurrence of the

Massachusetts Department of Environmental Protection.

Concur and recommended for immediate implementation:

U.S. Environmental Protection Agency

By: ____________________ Date: 7/25/11

James T. Owens, III
Director
Office of Site Remediation and Restoration
Region 1

A. SITE NAME, LOCATION AND DESCRIPTION

- Address
  Iron Horse Park
  High Street
  North Billerica, MA

- National Superfund electronic database identification number, e.g., CERCLIS identification number for Iron Horse Park is: MAD051787323

- The lead agency for Operable Unit 4 of Iron Horse Park is EPA

- Operable Unit 4 of Iron Horse Park is currently fund-lead

Site Description

The Iron Horse Park site (Site), located in Billerica Massachusetts, is a 553-acre industrial complex which includes manufacturing and rail yard maintenance facilities, open storage areas, landfills, and wastewater lagoons. A long history of activities at the site, beginning in 1913, has resulted in the contamination of soil, groundwater, sediment and surface water. Under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), 42 U.S.C. §§ 9601, *et seq*., the Site was listed on the National Priorities List (NPL) in 1984 and was subsequently divided into four operable units (OU). Although part of the same NPL listing, these four operable units are distinct areas of the Site. OU1, which consists of a former 15 acre wastewater lagoon area and OU2, a 60-acre landfill, have both completed remedial action. OU3, which is made up of seven source areas (Areas of Concern, or "AOCs"), is currently in remedial design with one AOC having completed Remedial Action. The OU3 remedy calls for capping of these source areas. Operable Unit 4, the subject of this Record of Decision (ROD), addresses the remediation of site wide groundwater, surface water, and sediment[1].

A more complete description of the Site can be found in Section 1 of the Feasibility Study (October 2010)

B. SITE HISTORY AND ENFORCEMENT ACTIVITIES

1. History of Site Activities

[1] Prior to 2004 OU3 also included addressing groundwater, sediment, and surface water at the Site. The initial OU3 RI/FS addressed these contaminated media. However, in 2004 OU4 was split off. The OU4 RI/FS incorporated the initial work done under OU3.

The 553 acres of land that now make up the Iron Horse Park Site were first purchased by the B&M Railroad (now Boston & Maine Corporation, a subsidiary of Pan Am Railways which is a subsidiary of Pan Am Systems, Inc.) in 1911. Prior to that year, the Site consisted of approximately 18 privately owned parcels that Boston & Maine Corporation (B&M) consolidated. Since 1911, a variety of industrial disposal practices have resulted in the creation of numerous lagoons, landfills, and open storage areas. At various times over the years, B&M has sold or leased several parcels of the land and some of the buildings on the Site to various companies. B&M operated an oil and sludge recycling area beginning sometime prior to 1938. This operation took place on property which was subsequently owned by Penn Culvert Company and currently, Cooperative Reserve Supply, Inc. In 1944, the B&M Railroad sold approximately 70 acres of land in the western portion of the Site to Johns-Manville Products Corporation, which at that time began to manufacture structural insulating board that contained asbestos. Three unlined lagoons were built to dispose of the resulting asbestos sludge waste. At approximately the same time, B&M leased approximately 15 acres of land in the eastern portion of the Site to Johns-Manville to be used as a landfill for asbestos sludge and other asbestos mill wastes generated by their manufacturing operations. EPA capped this landfill in 1984 as part of an "Immediate Removal Action" under CERCLA. The B&M Landfill, the RSI Landfill, and the B&M Locomotive Shop Disposal Areas were unmonitored landfill/disposal operations.

A more detailed description of the Site history can be found in Section 1 of the Feasibility Study (October 2010).

2. History of Federal Investigations and Removal and Remedial Actions

Date	Action	Legal Authority	Who Undertook	Results	Related Documents
1987	Site Investigation	CERCLA	EPA	Division of Iron Horse Park into operable units	Phase 1A Remedial Investigation
1997	Site Investigation	CERCLA	EPA	Risk Assessment	Remedial Investigation Final Report (OU3)
2004	Feasibility Study (OU3)	CERCLA	EPA		Proposed Plan

2004	Created OU4 to address Site groundwater, surface water and sediment	CERCLA	EPA	New operable unit	
2006	Ecological Risk Assessment / Wetlands Remedial Investigation Addendum	CERCLA	EPA	Risk Assessment	Feasibility Study
2008	Supplemental Human Health Risk Assessment	CERCLA	EPA	Risk Assessment	Feasibility Study
2010	Feasibility Study	CERCLA	EPA		Proposed Plan
2010	Proposed Plan	CERCLA	EPA		

3. History of CERCLA Enforcement Activities Regarding OU4

On October 22, 2010, EPA notified two (2) potentially responsible parties (PRPs) who either owned or operated the facility, generated wastes that were shipped to the facility, arranged for the disposal of wastes at the facility, or transported wastes to the facility of their potential liability with respect to OU4. In addition, on October 19, 2010, EPA issued Potentially Interested Party (PIP) letters to fourteen (14) parties. Negotiations with the PRPs have not yet commenced regarding a settlement to address the PRPs' potential liability at OU4.

The PRPs have been active in the remedy selection process for this Site. Two PRPs submitted comments on the Proposed Plan. The PRP comment letters (as well as other comments received during the comment period) are included in the Administrative Record. The comments are summarized and responded to in the Responsiveness Summary section of this ROD.

C. COMMUNITY PARTICIPATION

During the OU4 Proposed Plan public comment period there has been significant community interest in the Site. EPA has kept the community and other interested parties informed of Site and OU4 activities through informational meetings, fact sheets, press releases and public meetings. Below is a brief chronology of public outreach efforts.

- In September and December of 1983, and March and August of 1984, EPA held meetings in Billerica regarding environmental sampling and the Asbestos Landfill.

- In August 1985, the EPA released a community relations plan that outlined a program to address community concerns and keep citizens informed about and involved in remedial activities.

- In June and July, 2004, EPA held information meetings and public hearings regarding the OU3 Proposed Plan. The administrative record for OU3 was made available at this time. In addition, a 30 day public comment period was held from June 16, to July 16, 2004, to accept public comments on the alternatives presented in the OU3 Feasibility Study.

- On October 26, 2010, EPA made the administrative record for OU4 available for public review at EPA's offices in Boston and at the Billerica Public Library, 15 Concord Road, Billerica. This was established as the primary information repository for local residents and has been kept up to date by EPA.

- EPA published a notice and brief analysis of the Proposed Plan on October 14, 2010 in the Lowell Sun and on Oct 21, 2010 in the Billerica Minuteman and made the plan available to the public at the Billerica Public Library, 15 Concord Road, Billerica and at EPA Region 1's Superfund Records Center in Boston. In addition, the Proposed Plan was made available electronically on EPA's web site. Both notices also announced the October 27 informational meeting and the November 9 public hearing. Members of the public on the Iron Horse Park mailing list were also notified of the meetings by mail.

- On October 27, 2010 EPA held an informational meeting to discuss the results of the risk assessment and the cleanup alternatives presented in the Feasibility Study and to present the Agency's Proposed Plan to a broader community audience than those that had already been involved at the Site. At this meeting, representatives from EPA answered questions from the public.

- On October 28, 2010 in the Billerica Minuteman and on October 31, 2010 in the

Lowell Sun, EPA published notice of a public hearing to take place on November 9, 2010 to accept comments on the Proposed Plan.

- On November 9, 2010 the Agency held a public hearing to discuss the Proposed Plan and to accept any oral comments. A transcript of this meeting and the comments is part of this ROD at Appendix E and the Agency's response to comments are included in the Responsiveness Summary, which is Part 3 of this ROD.

- From October 25, 2010, to November 24, 2010, the Agency held a public comment period to accept public comment on the alternatives presented in the Feasibility Study and the Proposed Plan and on any other documents previously released to the public.

- An extension to the public comment period was requested and as a result, the public comment period was extended to January 14, 2011. EPA published notice of the extension in the Billerica Minuteman on November 18, 2010 and in the Lowell Sun on November 21, 2010. Members of the public on the Iron Horse Park mailing list were also notified of the extension by mail.

D. SCOPE AND ROLE OF OPERABLE UNIT OR RESPONSE ACTION

As with many Superfund sites, the problems at Iron Horse Park are complex. As a result, EPA has organized the work into 4 operable units (OUs):

• OU1: The **B&M Wastewater Lagoons** addressed contamination in an approximately 15 acre area, in and around the former wastewater lagoons. EPA selected a remedy for OU1 in a September 1988 ROD. The ROD selected bioremediation to address contamination in soil and sediment. This remedy was later modified to utilize off-site asphalt batching. The remedy for OU1 was completed in 2003 with a Remedial Action (RA) Report.

• OU2: The **Shaffer Landfill** addressed contamination at the 60 acre former mixed waste landfill. EPA selected a remedy for OU2 in a June 1991 ROD. The ROD selected capping and collection and disposal of leachate to address groundwater contamination. Construction of the remedy for OU2 was completed in 2003 with an Interim RA Report. OU2 is currently in the Operation and Maintenance phase.

• OU3: The OU3 ROD addressed the remaining, previously identified source areas within Iron Horse Park utilizing source control technologies to prevent direct contact with contaminants by human and ecological receptors and to prevent the spread of contamination to groundwater and surface water. OU3 is made up of 7 Areas of Concern (AOCs). Remedial action construction has been completed at 1 AOC. Remedial design for the other 6 areas is expected to be completed in 2011.

• OU4: Originally, it was intended that the OU3 ROD was to be the Final ROD for the Iron Horse Park Site. However, at the time of the OU3 ROD, EPA did not have site-specific ecological toxicity data which raised uncertainty in the ecological risk conclusions at that time. Subsequently EPA collected site-specific toxicity data and conducted an ecological risk assessment addendum regarding contamination in surface water and sediment. The risk assessment addendum was utilized to inform the need for and development of alternatives in the OU4 Feasibility Study. OU4 also addresses site-wide groundwater (except for groundwater associated with OU2 – Shaffer Landfill).

The selected response action for OU4 addresses low-level threat wastes by excavating and stabilizing contaminated sediments, by implementing stormwater controls to prevent additional contamination by surface runoff, and by monitoring groundwater and implementing institutional controls restricting groundwater use. These measures will address low-level threat wastes by eliminating ecological exposures to contaminated sediments and by ensuring that off-site migration or use of on-site groundwater does not occur.

E. SITE CHARACTERISTICS

The 553 acres of land that comprise the Site (Figure E-1) were first purchased by the B&M Railroad (now known as B&M Corporation) in 1911. Since 1911, a variety of industrial disposal practices have resulted in the creation of numerous lagoons, landfills, and open storage areas. Table 1-1 of the October 2010 FS Report provides a chronology of the activities at the Site.

The site is divided into four operable units (OUs). OU1 is the Boston & Maine (B&M) Wastewater Lagoons, OU2 is the Shaffer Landfill, and OU3 was originally the remainder of the site, including an active industrial complex (the Iron Horse Industrial Park), a railyard, numerous manufacturing operations, open storage facilities, landfills, and lagoons. Areas of concern (AOCs) in OU3 consist of the B&M Railroad Landfill, the B&M Shop Disposal Areas (A and B), the RSI Landfill, the Old B&M Oil/Sludge Recycling Area, the Contaminated Soils Area, and the asbestos contamination areas (including the Asbestos Landfill and the Asbestos Lagoons) (Fig E-2). Investigational activities, including a baseline ecological risk assessment (BERA) and baseline human health risk assessment (HHRA), were completed for OU3 in 1997. At the time of the FS for OU3, completed in 2004, it was decided that site-wide surface water, sediment, and groundwater required additional investigation and the OU3 FS was then limited to site source areas. Therefore, OU4 includes residual groundwater, surface water, and sediment contamination. It should be noted that groundwater associated with Shaffer Landfill (OU2), which was addressed under a 1993 ROD for OU2, is not included as part of the OU4 evaluation.

Therefore, when Site groundwater is discussed, it is Site groundwater west of Pond Street that is being referred to.

The previous investigations described in the OU3 remedial investigation/feasibility study (RI/FS) established that the concentrations of some groundwater contaminants exceed applicable or relevant and appropriate requirements (ARARs) or contribute to risk in excess of regulatory guidelines.

Based on the results of the OU3 HHRA and BERA, additional investigative activities were conducted at the Site. Investigative activities conducted in site wetlands and ponds, resulted in the preparation of a focused ecological risk assessment/wetland remedial investigation addendum (ERA/WRIA). Additional monitoring wells were installed and groundwater sampling activities were conducted resulting in an addendum to the HHRA (M&E, 2008). Subsequently, a focused FS for OU4 was prepared in order to support selection of a remedy to control human health and ecological risks and to supplement the RI (M&E, 1997) and FS (M&E, 2004) for OU3. As OU4 includes evaluations of site wide surface water, sediment and groundwater, the OU4 study area included all of Iron Horse Park. Richardson Pond, which borders the Site to the northeast, is also included in the OU4 study area. (Fig E-2)

Section 1 of the Feasibility Study of October 2010 contains an overview of the remedial investigation activities associated with groundwater, surface water and sediment at Iron Horse Park. The significant findings of these remedial investigation activities are summarized below.

Geographic Setting

The Site is located in North Billerica, Massachusetts, approximately 8 miles south of the New Hampshire border, at an elevation of about 115 feet above sea level.

Located in eastern Massachusetts, the Site is on the western side of the Seaboard Lowland section of the New England physiographic province, a subdivision of the Appalachian Highlands. The Seaboard Lowlands are characterized by extensive glacial outwash and till deposits overlying a complex of igneous and metamorphic rocks.

The Site lies on the western edge of the Shawsheen River drainage basin and is approximately 1.5 miles from the northward-flowing Shawsheen River. The Site is surrounded by upland areas on the southeast side, including several small forested hills near Pond Street, and low lying wetland areas on the western, northern, and northeastern side of the Site. Currently, 17% of the Site is characterized as wetlands.

Soils on and in the immediate vicinity of the Site are classified as predominantly urban land with other soil types to a lesser extent. Urban land is indicated in areas where the soil has been disturbed or altered, is obscured by cultural features (*e.g.*, buildings, industrial areas, roads, rail yards) and where these features cover more than 75% of the surface area.

The Site is used for industrial purposes, with no residential use. Some parts of the Site are fenced, but most of the Site is accessible to passers-by. The area within one mile of the Site boundary is primarily forest and residential, consisting primarily of single-family residential properties.

Surface waters in the vicinity of the Shaffer Landfill (OU2) on the Site are classified as Class B waters by the Commonwealth of Massachusetts and are designated for use as warm water fisheries and contact recreation. The Middlesex Canal, linking the Merrimack River to the Boston basin, runs through the Site, and some of its original features remain. It is essentially impassable for recreation or economic purposes. Histories of the canal indicate that clay was used along the canal banks to limit seepage of the canal water into neighboring lowlands. However, use of the clay liner in the canal may have been limited in extent.

A town inventory of historical properties revealed two historical assets within the site boundaries. The Small Pox Cemetery, dating back to 1811, is located between the Middlesex Canal and the MBTA commuter railroad line. The Content Brook Mill is located at the eastern end of the Shaffer Landfill property.

Files on five historic locations within or adjacent to the Site are maintained by the Massachusetts Historical Commission (MHC). These include the Pond Street Bridge over the B&M Railroad (inventoried as BIL.917), the Middlesex Canal (BIL 934, BIL K and BIL P), the B&M Railroad Billerica Shop Complex (BIL.299), the Equipment Storage Shed (BIL.300), the Maintenance Shed (BIL.301), and the Power Plant (BIL. 302), the last four being centrally located on the Site. These buildings were constructed between 1911 and 1914, and each was recommended as eligible for the National Register during the MBTA Historical Property Survey conducted in 1988 as noted in MHC files.

As shown in Figure E-3, part of the Site overlies what is classified as a medium-yield aquifer. The remainder is classified as a low-yield aquifer. No public water supply sources are located within the medium-yield aquifer on the Site. As shown on the figure, most of the groundwater within the medium-yield aquifer is considered a non-potential drinking water source by the Commonwealth of Massachusetts due to its location beneath an active railyard, but some isolated areas which were not included as part of this designation remain designated as potential drinking water source areas. Currently, there are no public water supply sources located within this aquifer., and due to the small size of these isolated areas, public water supply wells are not likely to be installed (*See* Groundwater Use and Value Determination, Massachusetts Department of Environmental Protection (MassDEP), 1998 and Priority Resource Map, MassGIS, Commonwealth of Massachusetts Executive Office of Environmental Affairs). The use and value of the groundwater is discussed further in Section F.

Although not currently in use, municipal public water supply wells are located less than 1 mile northeast of the Site in Tewksbury. The wells are located in a Medium Yield aquifer, the edge of which is located less than ½ mile to the northeast. Surface water and other groundwater municipal public water supplies are located at North Billerica on the Concord River, just north of the Route 3A bridge, where a filtration plant is located. Similar to the historical public water supply wells in Tewksbury, the North Billerica well is no longer in use.

There is at least one private well used for drinking water approximately 1200 feet north of the Site in the eastern Burnham Road area, based on interviews with community members. There may be additional private wells north of the Site. There may also be some private wells east of the Site on the eastern side of Pond Street. The Town of Billerica does not have records for these wells. It is not known whether any such private wells are used as sources of drinking water or for other domestic uses.

Geology

Bedrock underlying the Site is comprised of granite, schist, and diorite. Bedrock surface elevations suggest the presence of a trough in the bedrock surface trending northeast from the Old B&M Oil/Sludge Recycling Area to a small unnamed waterway referred to as the "Unnamed Brook," then northwest toward the Asbestos Lagoons. Bedrock fractures were found trending north-northeast and east-west.

The overburden primarily consists of glacial drift deposits including basal and ablation till and glacial outwash deposits. Basal till was found primarily on the southwestern portion of the Site, and ablation till was found primarily in the western and southern portion of the Site overlying basal till. Glacial outwash deposits were encountered throughout the Site. Peat deposits were encountered underlying fill materials near streams, ponds, and wetlands at the Site.

Hydrogeology

Groundwater in both the overburden and bedrock aquifers generally enters the Site from the southwest and flows to the northeast. Similarly, surface water flows onto the Site from the south and flows to the northeast, where it converges with B&M Pond and associated wetlands. Surface water flows off site by way of a series of wetlands (wetland complex) that has developed over time around the Unnamed Brook and its confluence with Middlesex Canal. Based on seepage meter, staff gauge, and mini-piezometer results, the potential for groundwater to discharge to surface water was evident throughout most of the Site.

Conceptual Site Model

The sources of contamination, release mechanisms, exposure pathways to receptors for the Site, as well as other site-specific factors, are diagrammed in a Conceptual Site Model (CSM), (Figure E-4). The CSM is a three-dimensional "picture" of site conditions that illustrates contaminant sources, release mechanisms, exposure pathways, migration routes, and potential human and ecological receptors. It documents current and potential future site conditions and shows what is known about human and environmental exposure through contaminant release and migration to potential receptors. The risk assessment and response action for the Site are based on this CSM.

The CSM summarizes the release of contaminants from industrial and urban sources, which have been transported through groundwater discharge, surface drainage, and sediment transport to surface water and sediment (secondary sources) within various areas of the Site.

Groundwater, surface water, sediments, and soil contamination were studied in the 1997 RI for OU3. A Record Of Decision (ROD) selecting the source control remedy at OU3 was issued in 2004 and included capping of landfills and contaminated soil areas at six different AOCs, along with maintenance of a landfill cap at a seventh AOC. A focused evaluation of ecological exposures to surface water and sediment, and a re-evaluation of site-wide groundwater contamination were deferred to OU4.

Contaminated sediments and surface water at the Site are likely the result of contaminated groundwater discharge and runoff impacted by contaminated soils. Based on the transport pathways described and the results of the HHRA and BERA conducted for OU3, the media of concern for OU4 are groundwater, surface water, and sediment.

The primary exposure pathways for human health are

- Site adult worker, current and future

Inhalation pathway: groundwater to indoor air (vapor intrusion)

- Site child/teenage trespasser, current and future

Ingestion pathways: surface soil[2], sediment
Dermal contact pathways: surface soil[2], sediment, surface water

- Area resident (adult/child), future

Ingestion, dermal contact, and inhalation pathways: groundwater
Inhalation pathway: groundwater to indoor air (vapor intrusion)

- Construction worker (adult), future

Ingestion and dermal contact pathways: groundwater

[2] Note that cumulative risk was evaluated for the Site child/teenage trespasser as part of the OU3 RI and included exposure to surface soil. Soil exposures were accounted for in the OU3 ROD and not presented as part of the CSM for OU4.

Inhalation pathway: groundwater to outdoor air

The primary ecological receptors for potential exposure to contaminated media at the site include organisms such as benthic invertebrates and aquatic receptors directly exposed to contaminants in sediment and surface water, and piscivorous birds that feed primarily on fish that may be impacted by site-related contamination. The aquatic and semi-aquatic receptors include organisms such as invertebrates in the surface water (zooplankton community), warm water fish, predatory birds, and benthic invertebrates exposed to sediments impacted by chemicals of potential concern (COPCs). Based on the OU3 BERA results, the indicator species and indicator communities identified at the Site and selected for further evaluation included aquatic receptors (zooplankton and fish), benthic invertebrates, and predatory birds, represented by the great blue heron.

Each of these indicator species or indicator communities may be exposed to substantial levels of contaminants through direct contact with and consumption of contaminated abiotic media or through the consumption of prey items that carry contaminant body burdens. The site conceptual model shows the exposure pathways by which these species may be exposed to COPCs. This model allows evaluation of direct and indirect (food-chain) impacts on major components of the aquatic and semi-aquatic receptors at the Site.

Nature and Extent of Contamination

The distribution of contaminants by media is described in this section.

Surface Water and Sediment

The following sections discuss the nature and extent of contamination in surface water and sediment at the site, based on both the 1993 and 2004 sampling results. Further details on sampling results may be found in the OU3 RI Report (M&E, 1997) and ERA/WRIA (M&E, 2006a).

1993 Sampling Data.

Surface water and sediment sampling locations (Figure E-5) were situated in different environmental settings across the Site, ranging from free-flowing channels in the Middlesex Canal and Content Brook, to emergent wetland environments in Richardson Pond, to a small almost stagnant channel in the Unnamed Brook. The chemical characteristics of the surface water bodies varied due to the differing environmental settings, as well as differences in nearby activities.

1. Surface Water

Organic compounds and elevated metal concentrations were detected in surface water locations across the site during 1993. The dominant types of organic compounds detected consist of aromatic and chlorinated volatile organic compounds (VOCs), polycyclic aromatic hydrocarbons (PAHs), phenolic compounds, and pesticides. Petroleum hydrocarbons were not detected in any of the surface water locations and polychlorinated biphenyls (PCBs) were detected only in September 1993 at two locations. For the most part, more organic compounds were detected in June 1993 than in September 1993. In all, organic compounds were found at 35 surface water locations in June 1993 and at 22 locations in September 1993, with at least one organic compound detected in one or more surface water locations from each of the areas sampled during one or both sampling rounds. The same types of organic compounds and metals detected in surface water were also found in soils from the various source areas in the industrial park, as well as soils and groundwater from nearby areas.

During both sampling rounds, aromatic VOCs were found in locations east of Pond Street, and at Richardson Pond and the Shaffer Landfill Wetlands. Chlorinated VOCs were primarily associated with the surface water location in the sedimentation pond south of the RSI Landfill. To a lesser extent, chlorinated VOCs were also detected in nearby surface water locations in the RSI Wetland Area, the Middlesex Canal associated with the B&M Pond, and the Unnamed Brook. Phenolic compounds and PAHs were detected in locations neighboring railroad tracks, roads, and Shaffer Landfill. These types of organic compounds were more prevalent in June 1993 than in September 1993. Pesticides were also more frequently detected in June 1993. Sixteen pesticides were identified in June 1993, compared to the eight identified in September 1993. Pesticides, as well as PAHs, were also present in at least one of the background surface water locations (collected from Wetland 10 and Wetland 11 as depicted on Figure E-5). The presence of pesticides was widespread, with at least one compound detected at 29 of the surface water locations. However, concentrations were indicative of residual levels, which are most likely adsorbed to particulates in the water column. Likewise, the infrequent detections of PCBs at relatively low concentrations suggest that the PCBs are being adsorbed to particulates.

In addition to major metal ions, metals were commonly found at many of the surface water locations as well as at background surface water locations during 1993. In total, manganese and thirteen other metals were found. In particular, elevated concentrations of chromium, copper, lead, manganese, vanadium, and zinc were found across the Site. Although there were no distinct trends, surface water in the Shaffer Landfill Wetlands east of the landfill exhibited the most elevated metal concentrations and specific conductances.

In general, the surface water locations where more organic compounds as well as elevated metal concentrations were consistently measured include the southwest corner of Richardson Pond (adjacent to the commuter rail line tracks and the bottom of the Pond Street embankment), Shaffer Landfill Wetland locations, one location in Content Brook, and the sample collected at the base of a discharge pipe in the sedimentation pond off the Unnamed Brook.

2. Sediment

During June 1993, a total of 46 site-wide sediment locations were sampled. Only 43 sediment locations were sampled during September 1993 because of dry conditions at three locations. As with surface water, organic compounds and elevated metal concentrations were detected at sediment locations across the Site. Background sediment (collected from Wetland 10 and Wetland 11 as depicted on Figure E-5) displayed chemical characteristics similar to those of associated surface water. The primary organic compounds detected in background sediment were PAHs and pesticides, both of which are common to residential and industrialized areas. In addition, the types of metals found at background locations include arsenic, chromium, cobalt, copper, lead, mercury, vanadium, and zinc.

The most prevalent types of organic compounds found in site-wide sediments were PAHs, petroleum hydrocarbons, pesticides, and PCBs. Volatile organic compounds (aromatic and chlorinated) were also commonly found, but less often and in lower concentrations. Aromatic VOCs were more prevalent in June 1993 than in September 1993 and were found at more locations and at higher concentrations than chlorinated VOCs. Aromatic VOCs (benzene, toluene, ethylbenzene, and xylenes (BTEX) compounds and chlorobenzene) were detected at fourteen sediment locations, most of which are scattered throughout the geographical location groupings, east of Pond Street. Chlorinated VOCs were primarily detected in June 1993 at three locations, all of which were east of Pond Street. In contrast, chlorinated VOCs were not present in the sediment sample collected from the location within the sedimentation pond where elevated chlorinated VOC concentrations were found at the corresponding surface water location.

In comparison, PAHs and pesticides were more widespread than VOCs, occurring in as many as 44 sediment locations. Like VOCs, PAHs and pesticides tended to be detected more frequently and in higher total concentrations in each location in June 1993 compared to September 1993. Multiple PAHs and pesticides were identified at most of the locations. For PAHs, the highest concentrations were usually reported for the larger, more substituted compounds. In addition, petroleum hydrocarbons and other fuel/petroleum-related combustion compounds (*e.g.*, dibenzofuran, phenolics, carbazole) generally occurred at sediment locations where PAHs were prevalent. For pesticides, the DDT group was detected more frequently and at higher concentrations than other pesticides. Of the 20 pesticides identified in June 1993, only seven were reported in September 1993. Both PAHs and pesticides were also present in background sediment locations.

Although PCBs were not as widespread as PAHs and pesticides, as many as six Aroclors were identified at 29 sediment locations in June 1993. In comparison, one Aroclor (1248) was found at three of the 29 locations in September 1993. The highest concentrations occurred at the four sediment locations in the northern portion of the Middlesex Canal, which is west of Pond Street and directly north of the Asbestos Lagoons. PCB contamination in this portion of the canal, as well as in the stormwater catch basins, wells, and soils in the vicinity of the canal and the BNZ facilities that are south of the Asbestos Lagoons (see Figure E-1), has been historically documented since 1986 (CDM, 1987; GZA, 1987). A summary of the PCB contamination in this area is summarized in the PCB Contamination Evaluation Report (M&E, 1994). Although PCB-contaminated sludge and sediment from the stormwater catch basins was removed in 1986 (GZA, 1987), previous findings indicated that sediments in this section of the canal remained contaminated, with individual Aroclor concentrations as high as 2,000 µg/kg. Additionally, PCBs were found in June 1993 at one location within four other geographical groupings: B&M Pond, Richardson Pond, Shaffer Landfill Wetlands, and the man-made canal near the B&M Locomotive Shop Disposal Areas.

In addition to major metal ions, beryllium, barium, manganese, and thirteen other metals were detected in sediments across the site. Arsenic, lead, and zinc were among the metals detected most often and at more elevated concentrations than those found in the background sediments.

1997 Risk Conclusions – Surface Water and Sediment

As documented in the Human Health Baseline Risk Assessment for OU3 (Section 6, OU3 RI), potential human health risks were estimated for exposures to surface water and sediment for a trespasser receptor. The trespasser receptor was expected to be the most highly exposed receptor. Risks were within or below EPA's target risk ranges for both carcinogenic and non-carcinogenic risks, for both surface water and sediment for all evaluations in all areas. The Human Health Baseline Risk Assessment for OU3 determined that there was no unacceptable risk to human health due to exposure to surface water or sediment. Therefore OU4 evaluations only evaluate the potential for ecological risk in these media.

2004 Sampling Data

Based on the results of the OU3 BERA, supplemental sampling in the wetland areas of the Site was conducted to support the ERA/WRIA. Surface water, sediment, and fish sampling locations are shown on Figures E-6, E-7, and E-8.

1. Surface Water

Surface water samples were collected at five locations corresponding to where fish sampling was to occur, including Richardson Pond (SW-RP samples), Content Brook (SW-CB samples), West Middlesex Canal (SW-MC samples), B&M Pond (SW-BM samples), and Round Pond (SW-RF reference samples). Surface water samples were analyzed for toxicity, as well as in triplicate for total and dissolved metals and alkalinity. Surface water toxicity tests were conducted on daphnid

(Ceriodaphnia dubia) and fathead minnow (*Pimephales promelas*) (see Feasibility Study Table 1-2).

The additional surface water samples collected in 2004 indicated elevated concentrations of both total and dissolved barium and manganese in each surface water body, including the reference location. Surface water analytical results from 2004 are presented in the Feasibility Study in Table 1-3, with comparison to benchmarks presented in Table 1-4. Dissolved aluminum, arsenic, lead, and zinc were also detected in surface water. Content Brook was the area from which most of the maximum detected metals concentrations were detected; maximum detects for both total and dissolved aluminum, barium, manganese, and zinc, dissolved cobalt, and total lead were detected in samples collected from Content Brook. Maximum total and dissolved arsenic, calcium, and magnesium concentrations were detected at Richardson Pond. From B&M Pond, the only maximum detects that were observed were for total copper and dissolved lead.

Fish

Fish samples were collected from four on-site surface water bodies (B&M Pond, Richardson Pond, Middlesex Canal down gradient of the Johns-Manville outfall, and Content Brook) and the reference water body (Round Pond). Fish sampling locations were selected based on habitats that could support fish.

Overall, the highest concentrations of most metals, including aluminum, arsenic, barium, chromium, cobalt, copper and manganese were detected in fish tissue samples collected from B&M Pond. The highest concentrations of lead, silver and zinc were detected in samples collected from Content Brook. The fish tissue samples from the reference pond, as well as Richardson Pond, generally had low concentrations of metals. Samples from the West Middlesex Canal had metals concentrations higher than the reference pond, although concentrations of chromium, cobalt, vanadium, and zinc were similar to those detected in Round Pond.

PAHs were detected in fish tissue samples collected from all site areas. Overall, the highest concentrations of PAHs were detected in fish from B&M Pond. The highest concentrations of the PAH acenaphthene were found in fish tissue samples collected from B&M Pond, one sample from Content Brook, and one sample from West Middlesex Canal. The maximum phenanthrene concentration was found in a sample collected from B&M Pond. Fish samples collected from the reference location were non-detect or estimated below the detection limit for anthracene, pyrene, and perylene. Two other semi-volatile organic compounds (SVOCs), biphenyl and dibenzofuran, were detected in fish tissue from each site area, but were not detected in the reference fish samples.

2. Sediment

Sediment sampling locations were selected in 2004 to represent 1993 sampling locations which had shown elevated levels of contamination and based on visual observations made during a site reconnaissance. In most cases, the staked location from historical sampling was located and samples were collected within a few feet of the previously sampled location. If a previous sampling location was not located or if sampling was to occur in a new location, the sediment sampling locations were selected based on where sediment deposition was likely to have occurred. A detailed discussion regarding the selection of sediment sampling locations is provided in Section 2 of the Data Evaluation Report (M&E, 2005). The sampling locations are shown on Figures E-6 and E-7.

Field screening was performed on the twenty on-site sampling locations and the three reference locations in order to select four on-site sediment sampling locations to undergo full characterization analysis. Sediment field-screening results for target metals, PAHs, PCBs, and Microtox® toxicity are discussed below.

Target Metals Field Screening

Field-screening analysis was performed using X-ray fluorescence spectrometry (XRF) for ten metals for the sediment samples collected, including arsenic, barium, cobalt, copper, chromium, lead, manganese, silver, vanadium, and zinc.

Arsenic was detected in 10 of the 23 sediment samples collected, with results ranging from 40.6 to 334 mg/kg, and detections occurring within at least one sample collected from each area, except the reference location, Round Pond. The highest arsenic concentrations were recorded in sample SED-01 (334 mg/kg) from Content Brook. Three of four samples from Content Brook had detectable arsenic concentrations and Richardson Pond sample, SED-14, also recorded an elevated arsenic concentration (317 mg/kg).

Lead concentrations were detected in 22 of the 23 sediment samples collected. The average lead concentration in sediment was 285 mg/kg. Lead was detected at all areas, including the reference area. The highest concentrations were in samples SED-05 (822 mg/kg) from B&M Pond, SED-11 (929 mg/kg) from West Middlesex Canal, and SED-17 (914 mg/kg) from the Unnamed Brook. The sediment samples from Content Brook and Round Pond, the reference location, contained lead at concentrations less than 200 mg/kg.

Detectable concentrations of barium were recorded in 18 of the 23 sediment samples collected. The detected concentrations ranged between 83.7 and 497 mg/kg, with the highest barium concentration in SED-20 collected from the Unnamed Brook. Copper was detected in 4 of 23 total samples, with detected concentrations between 121 and 930 mg/kg. These samples were collected from B&M Pond, the West Middlesex Canal, and the Unnamed Brook. Manganese was found at detectable concentrations in six sediment samples. The highest manganese concentrations were detected in B&M Pond samples SED-06 and SED-07 (839 and 3,120 mg/kg, respectively). All sediment samples collected from the reference pond contained detectable manganese concentrations (333 to 581 mg/kg). Zinc was detected in 21 of 23 sediment samples, with an average concentration of 370 mg/kg. The highest zinc concentrations were detected at locations SED-05 (3,870 mg/kg) collected from B&M Pond and SED-13 (1,090 mg/kg) collected within the Richardson Pond wetland. Chromium was only detected in sample SED-19 collected from the Unnamed Brook (511 mg/kg). Cobalt, silver, and vanadium were not detected at concentrations above their specific detection limit in any sample.

PAH Field Screening

All PAH results are discussed in dry weight. Total PAH concentrations were detected in all samples, with an average concentration of 51.1 mg/kg in the 23 samples. The highest concentrations were detected in samples SED-05 (161.6 mg/kg) and SED-07 (163.13 mg/kg) from B&M Pond, SED-12 (156.8 mg/kg) from the West Middlesex Canal, and SED-18 (116.84 mg/kg) from the Unnamed Brook.

PAH concentrations were 20 mg/kg or less in Content Brook and at Round Pond, the reference location. Of the four sediment samples from the B&M Pond area, two had total PAHs greater than 160 mg/kg, and the other two samples had total PAH concentrations less than 20 mg/kg. Samples from the West Middlesex Canal had total PAH concentrations ranging between 47.36 and 156.8 mg/kg, with the exception of sample SED-11 (6.1 mg/kg). PAH detections within samples from the Unnamed Brook ranged between 28.24 and 116.84 mg/kg. In Richardson Pond, total PAH concentrations ranged between 7.69 and 59.36 mg/kg.

PCB Field Screening

In all sediment samples, total PCB concentrations were below the detection limit, specific to percent solids of the sample.

Microtox® Screening

The Microtox® results were used in conjunction with the other field-screening analyses to select sediment samples for full characterization analysis, and to also provide evidence for relative sediment toxicity. Microtox® utilizes a bioluminescent bacterium, *Vibrio fischeri*, where a reduction in light output serves as a measure of toxicity, and percent effect, or reduction in light, is quantified at five and fifteen minutes. The percent effect after the five minute time period is representative of acute toxicity, while that after the fifteen minute time period serves as a measure of chronic toxicity. Both the five minute and fifteen minute percent effects are measured against controls. For example, if the measured luminescence of the bacteria was less than that of the control after five minutes, the percent effect at five minutes would be a positive percent effect. However, if after the fifteen minute period there was no difference in the measured luminescence of the same sample as compared to that of the control, the percent effect after fifteen minutes would be 0%. Therefore, a sample could have a positive percent effect at five minutes, but no percent effect at fifteen minutes. Microtox® testing was performed on whole sediment samples.

Use of Microtox® screening for sediment samples is supported by a number of studies documenting the consistency of the Microtox® results with the results reported of both sediment invertebrate toxicity tests and macroinvertebrate field surveys (Doherty, 2001; Day *et al.*, 1995; Giesy *et al.*, 1988; and Giesy and Hoke, 1989). According to these reports, the Microtox® solid-phase test was shown to be sensitive to a variety of contaminants in sediments. Because of differences in modes of action and differences between organisms, bacteria do not respond to all chemicals in the same manner and degree as other forms of aquatic life. For example, bacteria are thought to be sensitive to metals, showing particularly high sensitivity to copper (Giesy *et al.*, 1988). However, Microtox® results may display less sensitive to common pesticides and other chlorinated compounds such as PCBs (Giesy *et al.*, 1988). Microtox® is also less sensitive to ammonia in sediment pore water than *C. dubia* or *P. promelas*. Because of the differences in the results of microbial assays from those of higher organisms, microbial tests are often used along with other bioassays, as another screening tool and line of evidence for the toxicity of sediments to aquatic organisms.

In two Microtox® screening sediment samples collected from B&M Pond and East Middlesex Canal (SED-05 and SED-08, respectively), the highest response (approximately 60% effect) was measured at five minutes. SED-05 was selected for full characterization. From the West Middlesex Canal, two sediment samples (SED-10 and SED-11) showed approximately 50% effect at fifteen minutes; SED-11 was one of the samples chosen for full characterization. Three of the four samples from Content Brook (SED-01, SED-02, and SED-04) showed percent effects ranging from 28% to 37% at five minutes, including SED-01 which was also selected for full characterization. Lower percent effects were observed from samples from the Unnamed Brook (SED-17, SED-18, SED-19, and SED-20), Richardson Pond (SED-13, SED-14, and SED-15), and Round Pond (reference samples SED-21, 22, and 23), with the exception of sample SED-16 from Richardson Pond which showed approximately a 45% effect at fifteen minutes.

Full Characterization Results

Five sediment samples were selected for full characterization analyses, including four that were based on either elevated field-screening results (three site samples) or the lowest field-screening result (one reference sample), as well as one location within B&M Pond that had been the location of the highest historical 4,4'-DDD detection. Since the samples were screened for toxicity, PAHs, PCBs, and ten target metals, there were numerous variables to consider within the field-screening results to select samples for full characterization analyses. In addition, a spatial separation of full characterization samples across the site was desired, to better characterize site-wide risks during the ERA/WRIA.

Sediment samples selected for full characterization include SED-01 (within the Content Brook Area), SED-05 (within B&M Pond), SED-11 (within the West Middlesex Canal), SED-18 (within the Unnamed Brook), and SED-22 (within the reference area - Round Pond). The locations of the sediment samples selected for full characterization are depicted on Figure E-8. No samples were selected from Richardson Pond for full characterization. The rationale for the selection of sediment samples for full characterization is provided in Section 2 of the ERA/WRIA (M&E, 2006a). Historical data, as well as the field-screening results were considered during the selection of samples for full characterization. Samples selected for full characterization were analyzed for grain size, toxicity, and chemical analyses including total organic carbon (TOC), target metals, 4,4'-DDD, PCBs, and PAHs.

Full characterization analysis of sediment samples confirmed elevated total PAHs for B&M Pond and the Unnamed Brook, whereas lower concentrations (*i.e.*, comparable to the reference location) were detected for West Middlesex Canal and Content Brook.

Metals field screening indicated detected concentrations of several target metals, including arsenic, chromium, copper, lead, manganese, silver, and zinc in one or more sediment samples. Fixed-laboratory metal analysis of sediment samples collected from B&M Pond indicated the highest concentrations of most metals, except arsenic and manganese. For this location, concentrations of arsenic, barium, chromium, cobalt, copper, lead, and zinc exceeded the reference metal concentrations by one to two orders of magnitude. Sediment samples collected from Content Brook had the highest concentrations of arsenic and manganese. The lowest metals concentrations of the site locations were detected in the West Middlesex Canal sediment sample. The highest concentrations of 4,4'-DDD, Aroclor-1254 and Aroclor-1260 were detected in the sample from B&M Pond. Lower concentrations of 4-4'-DDD were reported for sediment samples collected from Content Brook and the Unnamed Brook. The reference location indicated a 4-4'-DDD concentration at a comparable level as found in the Unnamed Brook.

Groundwater

The following sections discuss the nature and extent of contamination in groundwater at the Site, based on both the 1995 and 2005/2006 sampling results. The 1995 and 2005/2006 data sets are discussed separately. The initial purpose of most of the groundwater sampling locations was to characterize groundwater in relation to one or more of the known Iron Horse Park source areas.

<u>**1995 Sampling Data**</u>

Groundwater sampling locations are presented on Figure E-9. In the following sections, historical contaminant distribution is presented for five OU3 areas of concern (AOCs), as discussed in the OU3 RI/FS (M&E, 1997; M&E, 2004).

1. B&M Railroad Landfill

Wells located in the landfill exhibited the highest concentrations of contaminants, especially organic compounds. Aromatic and chlorinated VOCs, PAHs, pesticides, PCBs, and elevated metal concentrations were measured in groundwater, but concentrations were considerably lower than in soil. Although no non-aqueous phase liquids (NAPLs) were found, oily sands were observed at several depths; in conjunction with the types of organic compounds that were detected, this suggests the presence of NAPL. Degradation of trichloroethylene (TCE) is evidenced by the presence of its potential byproducts, including both isomers of dichloroethylene (DCE).

2. RSI Landfill

Aromatic VOCs, pesticides, and PCBs were detected in groundwater at low concentrations. The detection of chlorinated VOCs in upgradient, as well as downgradient and vicinity wells, indicated that upgradient sources may be affecting groundwater quality. The presence of elevated vinyl chloride and dichlorinated VOCs directly downgradient of landfilled wastes and near the water table (groundwater screening locations) were indicative of the degradation of chlorinated VOCs. Aromatic VOCs found in a groundwater cluster near the Asbestos Landfill and the RSI Landfill were most likely from the Asbestos Landfill. The basis for this conclusion is: these wells are located immediately downgradient of the Asbestos Landfill, the contaminant concentrations in these wells were consistent between sampling rounds, and concentrations of aromatic compounds at the levels detected in these downgradient wells were not found elsewhere on-site.

3. B&M Locomotive Shop Disposal Areas

A few organic compounds (including one VOC, a few pesticides, and one PCB Aroclor) and heavy metals were detected in groundwater in the downgradient and vicinity wells. The detection of organic compounds and some heavy metals in the upgradient cluster indicated that other sources may be present in the vicinity. Mercury and copper were the only detected metals that were not found in the upgradient wells.

4. Old B&M Oil/Sludge Recycling Area

Although aromatic VOCs, PAHs, and petroleum hydrocarbons were generally not present in groundwater, chlorinated VOCs and heavy metals were detected. Heavy metals, which were detected primarily in shallow overburden groundwater, include arsenic, chromium, cobalt, lead, mercury, nickel, and zinc. Petroleum hydrocarbons were measured in one well, and several inches of floating product were observed in one piezometer in the southern oil/sludge area.

5. Contaminated Soils Area

Since surface soil contamination was of key concern in this area, this was the only medium sampled. Organic compounds, including PAHs, petroleum hydrocarbons, and pesticides, were measured in surface soils in localized areas. Lead and manganese were the heavy metals that were detected most often and in the highest concentrations. Cyanide was detected in a localized area along the southeastern boundary.

6. Asbestos Lagoons

Groundwater contaminants included VOCs (primarily aromatic and chlorinated VOCs), PAHs, PCBs and pesticides. Several of the chlorinated VOCs (perchloroethylene (PCE), TCA, and dichloroethane (DCA)) and heavy metals (arsenic, cobalt, lead, and zinc) were detected in the shallow overburden, deep overburden and bedrock flow zones. The types of contaminants found were similar to those detected in the 1980s during the investigations related to the Johns-Manville stormwater drainage system (OU3 RI, Appendix A-2, M&E, 1997). Detected heavy metals and organic compounds were primarily found in downgradient wells near the lagoons.

2005/2006 Sampling Data

To provide an updated assessment of the nature and extent of groundwater contaminants at the Site, groundwater from fifteen new monitoring wells and 45 existing monitoring wells was sampled during winter 2005-2006. Groundwater monitoring well locations are shown on Figure E-9.

In general, the 2005-2006 monitoring shows that a noticeable contaminant plume is still not evident and that the Site continues to have a variety of contaminants distributed throughout the Site at relatively low concentrations compared to Site groundwater performance standards that have been developed in this ROD (see Section L). In comparing the 2005-2006 monitoring results to historical results, many of the organic compounds previously detected above Site groundwater performance standards have decreased to concentrations below the Site groundwater performance standards at those same wells. However, samples from some wells have analytes not previously detected. Some of these analytes (e.g., 1,1-DCA, and vinyl chloride) are breakdown products possibly resulting from natural attenuation of groundwater contaminants occurring at the Site. Since historical detection limits were not as sensitive as those used in the recent sampling round, it is also possible that detection of analytes not previously reported may be attributable to the increased analytical sensitivity.

Table E-1 provides a well-specific summary of notable detections and observations for the winter 2005-2006 groundwater monitoring round. The table also provides the primary rationale for well selection, based on historical monitoring data, for comparison purposes.

1,4-Dioxane was detected in six out of fifteen locations at the Site. However, the maximum detection was 2.9 μg/L, which is less than the state guideline of 3 μg/L. 1,4-Dioxane is known to be associated with releases of chlorinated solvents, particularly 1,1,1-TCA. The low concentrations of both 1,4-dioxane and chlorinated solvents are consistent with the hypothesis that much of the site contamination by chlorinated solvents is likely due to smaller spills/releases across the Site, rather than any significant releases. Based on the available data, these concentrations also indicate that 1,4-dioxane is not likely to be a significant site contaminant.

In reviewing the OU3 AOCs (see Figures E-1 and E-9 for locations of AOCs and monitoring wells) and with respect to the 2005-2006 monitoring results, the following observations are noted (monitoring well clusters used for evaluation of each AOC are noted in brackets):

- The Old B&M Oil/Sludge Recycling Area [MW-202, MW-203, MW-301, MW-302, MW-303, and OW-37/38] did not show evidence of light non-aqueous phase liquids (LNAPL) in MW-303, installed near the destroyed piezometer P-12, which previously showed evidence of LNAPL. Arsenic and manganese were detected in the area above Site groundwater performance standards. It appears that there may have been a release involving carbon tetrachloride after the 1995 sampling events, as evidenced by the detection in MW-202S (120 μg/L) and the downgradient OW-38 (deep overburden; 37 μg/L). While carbon tetrachloride did not have a Site preliminary remediation goal (PRG) developed previously for OU3(prior to the OU4 split), these concentrations are above the federal Maximum Contaminant Level (MCL) of 5 μg/L. There is also some residual evidence (1,1,1-TCA and 1,4-dioxane) in MW-203D of a historical release in the area.

- Monitoring around the Locomotive Shop Disposal Areas [MW-204, MW-205, and MW-206] only showed exceedances of Site groundwater performance standards by manganese (300 μg/L).

- Near the Asbestos Lagoons [MW-208, MW-209, OW-09/10/12, and OW-20], arsenic and manganese concentrations are still above Site groundwater performance standards (10 μg/L and 300 μg/L, respectively). Most of the chlorinated VOCs detected historically have decreased in magnitude. One location, OW-20, showed increased detections of chlorinated VOCs.

- The furthest downgradient wells [MW-1/1A/1B/1C] did not show any Site groundwater performance standards exceedances and only showed low organic detections.

- At the B&M Railroad Landfill [MW-213, MW-214, and MW-215; PZ-115], a LNAPL sample was collected at PZ-115 and determined to be No. 6 Fuel Oil (see Appendix F for results). MW-214S (downgradient of PZ-115) showed PAH detections close to reporting limits. TCE was still detected in the bedrock wells MW-213B and OW-49 at concentrations above the Site groundwater performance standard, but trending downwards. Arsenic and manganese were detected above Site groundwater performance standards.

- The wells sampled to provide information on the Contaminated Soils Area [MW-304 and OW-35] showed a few detections of organics close to reporting limits, and only manganese at OW-35 just above the Site groundwater performance standard. The wells which are on the upgradient end of the area (OW-37 and OW-38), may have been impacted by releases near the Old B&M Oil/Sludge Recycling Area, as well as site operations. These two wells have miscellaneous organics detected and, along with the carbon tetrachloride discussed above, show PCE detected above the Site groundwater performance standards in the deep overburden (OW-38).

- For the RSI Landfill [MW-210, MW-211, MW-212, and OW-01/02], organic detections appear to be reducing in magnitude. Arsenic and manganese concentrations are still above Site groundwater performance standards.

- The Asbestos Landfill [MW-207, MW-305, MW-307, MW-308, OW-25/26, and OW-07/08] had seven new wells installed during this investigation. Upgradient locations showed a number of organics detected, including TCE and PCE above Site groundwater performance standards in MW-207B. MW-306S showed detections close to the reporting limits of many SVOCs, including phenols, phthalates, and PAHs. These are likely residuals from the previous lagoon operations in the area (at OU1). Downgradient locations (MW-307 cluster, MW-308B, OW-07 and -08) showed VOCs detected both above and below Site groundwater performance standards. Benzene detections above the Site groundwater performance standards were confirmed in the area. Detections of chlorinated VOCs above site PRGs were also found in both the MW-307 cluster and MW-308B. As with the other areas of the Site, arsenic and manganese concentrations were detected above Site groundwater performance standards.

- In the overburden flow zone, 33 of 43 monitoring wells had at least one Site groundwater performance standard exceedance. In the bedrock flow zone, 10 of 17 wells had at least one Site groundwater performance standard exceedance (Figures E-10 and E-11).

Groundwater Summary

Locations of Site groundwater performance standard exceedances are spread over the Site without any pattern that suggests a plume or plumes. Similarly, the locations of the maximum detections for individual contaminants are also spread across the Site without a discernable pattern. In all probability, numerous relatively small source areas and small non-centralized spills, have over time, lead to the widespread nature of the contamination at comparatively low concentrations and data which does not exhibit significant sitewide trends. (see Tables E-2 and E-3)

Contaminant Fate and Transport

Similar to the historical discussion of contaminant nature and extent, the following sections present a description of contaminant fate and transport by AOC, as discussed in the OU3 RI/FS (M&E, 1997; M&E, 2004). Discussion of surface and subsurface soil is included as it relates to groundwater contaminant fate and transport in each area. It should be noted that at the time of this ROD, remedial designs are being generated to cover multiple AOCs at the Site as part of OU3. Construction of these remedies is expected to impact the fate and transport of contaminants at the Site.

B&M Railroad Landfill

Since organic materials are prevalent in soils, PCBs, PAHs, and pesticides are not expected to migrate appreciably in the unsaturated zone. It is also expected that the mobility of metals will be limited due to adsorption and other processes in soil. A migration pathway for VOCs in the unsaturated zone may be via vapor phase, since VOCs were detected more often at the water table (in groundwater screening locations) than with depth below it.

With the exception of VOCs, most contaminants found in the saturated zone soils (pesticides, PCBs, PAHs, phthalates, and heavy metals) will not migrate significantly in the dissolved phase as evidenced by the groundwater quality in wells across from B&M Pond. The presence of PCBs and pesticides below the limits of the waste indicate that residual or pooled dense non-aqueous phase liquids (DNAPL) may be present, although none was observed. Groundwater levels and analytical data indicate that groundwater is migrating vertically. Contaminants in the dissolved phase may migrate from the landfill to the B&M Pond to the east and the Middlesex Canal to the south as evidenced by downgradient contamination. Measured vertical gradients indicate groundwater discharges to the Middlesex Canal and B&M Pond.

RSI Landfill

Borings indicate that wastes exist above and below the water table. The absence of a low-permeability cover allows for contaminant transport from the unsaturated to the saturated zone.

Similar to the B&M Railroad Landfill, relatively elevated concentrations of PCBs, PAHs, and phthalates are found in the unsaturated zone. These compounds in percolating water may be highly attenuated through adsorption to organic matter in the soils. Although these compounds may also migrate vertically in DNAPL form, no DNAPL was observed. Most metals are fairly immobile due to adsorption and low solubility; however, leaching is possible. Chlorinated VOCs (DCE and vinyl chloride) detected in groundwater screening samples indicate the partitioning of these compounds to the vapor phase. Therefore, vapor phase movement may be a prominent transport mechanism at the water table.

Most organic compounds with the exception of VOCs often do not migrate significantly in the dissolved phase. Pesticides, PAHs, phthalates, and PCBs adsorb to organic matter in soils. However, due to the presence of sandy soils with less organic material, contaminant transport is of greater concern. Based on the direction of groundwater flow, contaminants in the dissolved phase would likely migrate toward the Middlesex Canal to the northeast and the unnamed brook to the southeast. Although vertical gradients are low, the existence of shallow bedrock facilitates contaminant transport from the overburden to bedrock. The presence of pesticides and PCBs in the deep overburden and bedrock groundwater indicates the potential for localized DNAPL pools; however, this was not confirmed during the field activities. Measured vertical gradients and seepage velocities indicate discharge from groundwater to the Unnamed Brook.

B&M Locomotive Shop Disposal Areas

Borings indicate that wastes exist above and below the water table. PAHs were found in the highest concentrations, especially in subsurface soils, while pesticides, PCBs, VOCs, and petroleum hydrocarbons were found at lower concentrations. The absence of a low-permeability cover facilitates contaminant transport from the unsaturated to the saturated zone. However, pesticides, PCBs and PAHs in percolating water may be highly attenuated through adsorption to organic matter in the soils.

Aromatic VOCs, PAHs, and petroleum hydrocarbons were notably absent in groundwater, although they were prevalent in subsurface soils. The absence of PAHs may be attributed to adsorption to soils. The absence of aromatic VOCs and petroleum hydrocarbons may be due to the placement of well screens below the water table. The potential for biodegradation of chlorinated compounds is evidenced by the existence of the breakdown products DCE and vinyl chloride near the water table. Based on the direction of groundwater flow, contaminants in the dissolved phase from both areas will migrate toward the northeast with potential downgradient discharge to the Unnamed Brook. Although vertical hydraulic gradients tend to be downward, there is no evidence that vertical migration of contaminants has occurred at this point.

Old B&M Oil/Sludge Recycling Area

Subsurface soils exhibited the highest concentrations of contaminants including aromatic VOCs, PAHs, petroleum hydrocarbons, and metals. Although some of the area is covered with asphalt, the absence of a low-permeability cover may facilitate contaminant transport to the saturated zone (especially VOCs). However, PAHs, pesticides, and metals will tend to adsorb to the organic matter (peat) prevalent in soils in this area. While observations of free product in the area have been made in the past, currently there is no evidence of LNAPL. Note that current pre-design efforts for the OU3 source control remedy in this area include investigating for further evidence of LNAPL, and no further evidence of LNAPL has been found to date.

Aromatic VOCs, PAHs, and petroleum hydrocarbons were notably absent in groundwater, although they were prevalent in subsurface soils. The absence of PAHs may be attributed to adsorption to soils. The absence of aromatic VOCs and petroleum hydrocarbons may be due to the placement of well screens below the water table. The potential for biodegradation of chlorinated VOCs is evidenced by the existence of the breakdown products DCE and vinyl chloride in groundwater. Based on the direction of groundwater flow, contaminants in the dissolved phase will likely migrate toward the northeast. Vertical hydraulic gradients tend to be downward from shallow overburden and upward from bedrock to deep overburden. The presence of chlorinated VOCs in the deep overburden lends credence to this observation.

Contaminated Soils Area

Soil contamination is likely the result of surface discharge from various work-related activities and is probably limited to surface soils. Evidence of free product spills included visual observation of oil-soaked or stained soils. Elevated levels of lead were detected throughout the area. Since lead is relatively insoluble and strongly adsorbed, significant migration in the unsaturated zone is not expected.

Asbestos Lagoons

The limits of waste relative to the water table were not defined, since drilling was not conducted within the lagoons. The predominant types of compounds found in groundwater include pesticides and PAHs, which are likely to be strongly adsorbed to soils. Concentrations of several metals were elevated, with calcium levels most elevated. This was to be expected due to the plasterboard materials that were disposed of here.

Several metals, a few chlorinated VOCs, and PAHs were most prevalent in the deep overburden and bedrock groundwater. PCBs were detected in a shallow well adjacent to catch basins. Past wastewater discharges, stormwater drain leakages, and mounding caused by rainfall likely induced vertical migration of contaminants beneath the area. Low concentrations of pesticides in groundwater may be the result of percolating rainwater. Chlorinated VOCs are likely the most mobile contaminants. Groundwater flow is divided, with flow to the northwest toward

Middlesex Canal and to the northeast. Vertical gradients tend to be downward from shallow to deep overburden near the lagoons, but upward from bedrock to overburden at the downgradient wells.

Site-Wide Surface Water and Sediment

Throughout the Site, groundwater discharges to surface water and contributes contaminants to surface water. Inflow to surface water also consists of surface water runoff via overland flow and direct rainfall. Data collected indicate that fewer organic compounds were detected in September 1993 than in June 1993, which may reflect conditions of decreased groundwater discharge and overland flow runoff in late summer and early fall. Adsorption to sediments is likely the primary attenuation mechanism for contaminants in surface water.

Primary transport pathways for sediments include overland flow runoff from the adjacent land mass, including the potential OU3 source areas, and resuspension in the flowing water bodies, especially the Middlesex Canal and the Unnamed Brook. Contaminants detected in sediment were not typically detected in Site groundwater. Pesticides were frequently detected in sediment across the Site. PCBs have been detected in the Middlesex Canal due to past discharges from the Johns-Mansville facility (the current BNZ Materials property), however PCBs have not been detected above cleanup levels at this area of the Site. The adsorption of contaminants is likely, since the sediments are high in organic carbon content. Since surface water velocities are not high within the Site, scouring and resuspension of sediments is not a dominant transport mechanism, but becomes more important during storm events that result in periods of high flow.

<u>Principal and Low-Level Threats</u>

Principal threat wastes are those source materials considered to be highly toxic or highly mobile which generally cannot be contained in a reliable manner or would present a significant risk to human health or the environment should exposure occur. The manner in which principal threats are addressed generally will determine whether the statutory preference for treatment as a principal element is satisfied. Wastes generally considered to be principal threats are liquid, mobile, and/or highly-toxic source material.

There are no principal threat wastes at OU4.

Low-level threat wastes are those source materials that generally can be reliably contained and that would present only a low risk in the event of exposure. Wastes generally considered to be low-level threat wastes include non-mobile contaminated source material of low-to-moderate toxicity, surface soils containing chemicals of concern that are relatively immobile in air or groundwater, low leachability contaminants, or low toxicity source material.

Contaminated sediments and groundwater are low-level threat wastes at OU4. The receptors for contaminated sediments are benthic invertebrate populations, particularly in Unnamed Brook and B&M Pond, due to sediment PAHs, 4,4'-DDD, PCBs, and metals. The receptor for groundwater is a hypothetical future on-site resident using a residential well due to 1,2-dichloroethane, 1,4-dichlorobenzene, benzene, carbon tetrachloride, cis-1,3-dichloropropene, tetrachloroethene, trichloroethene, vinyl chloride, atrazine, bis(2-chloroethyl)ether, dibenz(a,h)anthracene, dieldrin, arsenic, cadmium, lead, and manganese. There is no current exposure to contaminated groundwater, impacted groundwater is not migrating off-Site, and impacted Site groundwater is not considered a potential drinking water source, except for small inclusions of potential drinking water source areas. The small areas lie between or immediately adjacent to OU3 waste management areas within the Site so have limited to no potential for any development for groundwater use due to the impacts of the wastes permanently in place within the waste management areas on the potential drinking water source areas.

F. CURRENT AND POTENTIAL FUTURE SITE AND RESOURCE USES

The land associated with OU4, which encompasses all of the Iron Horse Park Site except OU2 (Shaffer Landfill), is used for industrial purposes, with no residential use. The wetland areas are undeveloped and are primarily adjacent to industrial, rather than residential, areas. The Middlesex Canal is essentially impassable for recreation or economic purposes, although it is an historic structure that someday could be developed as parkland or utilized as a resource in some other manner. Some parts of the Site are fenced, but most of the Site is accessible to passers-by. The area within one mile of the Site boundary is primarily forest and residential, consisting primarily of single-family residential properties.

The town zoning map indicates that aside from a small section of commercially zoned land toward the southwest corner, the Iron Horse Park Site is zoned industrial. Consultation with the Billerica Planning Board indicated that future land use is expected to remain industrial. The industrial zoning extends beyond the boundary of Iron Horse Park. The immediate surrounding area consists of rural residence and neighborhood residence zoning categories with a few small areas of general business zoning.

- Groundwater Uses:

Massachusetts GIS has mapped water related resources in Massachusetts, including in the area around the Iron Horse Park Site. Part of the Site overlies what is classified as a medium-yield aquifer. Medium-yield aquifers are generally considered to be a potential drinking water source. Due to the presence of a railyard over a portion of this aquifer, the MassDEP has reclassified most of this aquifer as a non-potential drinking water source (Figure E-3), considered to be of low use and value (Groundwater Use and Value Determination, MassDEP, 1998). The portion of the aquifer that is still classified as a potential drinking water source is considered to be of medium use and value. The aquifer below the OU3 waste management areas includes portions, but not all, of both the non-potential drinking water source areas and the potential drinking water source areas situated within the Site. However, the aquifer below the OU3 waste management areas is not usable for any potable or non-potable use because the waste left in place at the waste management areas will be a continuing source of contamination. (See also the discussion of the compliance boundary under the heading "GW-2 Limited Action" in "Section J. Description of Remedial Alternatives," below.) No public water supply sources are located within the Site.

Residential areas around the Site are on public water supply, but there may be some residents with private wells that are not documented with local authorities. There is at least one private well used for drinking water approximately 1200 feet north of the Site in the eastern Burnham Road area. There may be additional private wells north or east of the Site.

- Surface Water and Sediment Uses

The current use(s) of the surface water at the Site and surrounding areas is as a warm water fishery and for contact recreation. On Site contact recreation would primarily be by trespassers.

G. SUMMARY OF SITE RISKS

A baseline risk assessment was performed to estimate the probability and magnitude of potential adverse human health and environmental effects from exposure to contaminants associated with the Site assuming no remedial action was taken. It provides the basis for taking action and identifies the contaminants and exposure pathways that need to be addressed by the remedial action. The human health risk assessment followed a four step process: 1) hazard identification, which identified those hazardous substances which, given the specifics of the site were of significant concern; 2) exposure assessment, which identified actual or potential exposure pathways, characterized the potentially exposed populations, and determined the extent of possible exposure; 3) toxicity assessment, which considered the types and magnitude of adverse health effects associated with exposure to hazardous substances, and 4) risk characterization and uncertainty analysis, which integrated the three earlier steps to summarize the potential and actual risks posed by hazardous substances at the site, including carcinogenic and non-carcinogenic risks and a discussion of the uncertainty in the risk estimates. A summary of those aspects of the human health risk assessment which support the need for remedial action is discussed below followed by a summary of the environmental risk assessment.

1. Human Health Risk Assessment

A baseline human health risk assessment (HHRA) was completed for the Iron Horse Park Superfund Site, Operable Unit 3 (OU3) to evaluate the likelihood and magnitude of potential human health effects associated with historical disposal practices. The baseline HHRA was presented in the Remedial Investigation Final Report (M&E, 1997) and provides estimates of risk, under both current use and hypothetical future use scenarios, to both the central tendency (CT) and the reasonably maximum exposed (RME) receptor. Note that cumulative effects were calculated for each receptor, so discussions include reference to the following media: upland surface soil, sediment, surface water, and groundwater. Risks/hazards associated with surface soil are being addressed as part of the OU3 remedy.

In the baseline HHRA for OU3, surface soil analytical results were evaluated for five areas of concern (AOCs): B&M Railroad Landfill, RSI Landfill, B&M Locomotive Shop Disposal Areas, Old B&M Oil/Sludge Recycling Area, and Contaminated Soils Area. Surface water and sediment analytical results were evaluated for three AOCs: West Middlesex Canal Area, Central Wetlands Area, and East Middlesex Canal and Wetlands Area. Groundwater analytical results from three aquifers (shallow overburden, deep overburden, and bedrock) were evaluated in five AOCs: B&M Railroad Landfill, RSI Landfill, B&M Locomotive Shop Disposal Area, Old B&M Oil/Sludge Recycling Area, and Asbestos Lagoons (i.e., a total of 15 groupings).

A supplemental baseline HHRA was performed as part of the OU3 FS process (M&E, 2004) for the Old B&M Oil/Sludge Recycling Area. The supplemental baseline HHRA provides estimates of risk, under hypothetical future use scenarios, to both the CT and the RME receptor. Note that risks/hazards associated with soil in this area are being addressed as part of the OU3 remedy.

Soil analytical results (surface and subsurface soil combined) were evaluated for the Old B&M Oil/Sludge Recycling Area since subsurface levels for some contaminants exceeded levels in surface soils. It is assumed that future site development results in the movement of soil contaminants, currently at depth, to the surface.

As part of OU4 a supplemental human health risk assessment was performed to evaluate the current and potential future human health risks and hazards associated with direct and indirect exposure to groundwater, including vapor intrusion, potentially impacted by the Site, based on groundwater data collected in the winter of 2005/2006 (M&E, 2008).

As risks/hazards associated with soil at the Site are being addressed as part of the OU3 remedy, the following sections only present information related to the OU4 media: groundwater, surface water, and sediment. Furthermore, surface water and sediment summary information is taken from the baseline HHRA in the RI (M&E, 1997), while groundwater summary information is taken from the supplemental HHRA (M&E, 2008).

Section 1: Identification of Chemicals of Concern

Fifty-three of the more than 100 chemicals detected at the Site were selected for evaluation in the human health risk assessments as chemicals of potential concern for groundwater. The chemicals of potential concern were selected to represent potential Site-related hazards based on toxicity, concentration, frequency of detection, and mobility and persistence in the environment and can be found in Tables 6-12 and 6-13 of the RI (M&E, 1997) and in Tables 3.1 through 3.3 of the supplemental HHRA (M&E, 2008). From this, a subset of the chemicals was identified in the OU4 FS (M&E, 2010) as presenting a significant potential future risk. These chemicals are referred to as the chemicals of concern (COCs) in this ROD and summarized in Table G-1 for groundwater. This table contains the exposure point concentrations (EPCs) used to evaluate the reasonable maximum exposure (RME) scenario in the supplemental risk assessment for the chemicals of concern. There was no significant current or future risk to human health due to exposure to Site sediment and/or surface water.

Section 2: Exposure Assessment

Current and potential future Site-specific pathways of exposure to chemicals of concern were determined. The extent, frequency, and duration of current or future potential exposures were estimated for each pathway. From these exposure parameters, a daily intake level for each Site-related chemical was estimated.

The Site is an active industrial area. Fencing and signs discourage access to the Site by non-workers. However, it is possible for trespassers to enter the Site. Land use in the area surrounding the Site is primarily residential. Future use of the Site is expected to remain industrial. However, because of nearby residential areas, future residential use of groundwater impacted by the Site was considered.

No current exposure pathways were found to present a significant risk at the Site.

The only future exposure pathway found to present a risk at the Site was for a resident (adult and young child) with exposure (by ingestion, dermal contact, and inhalation) to untreated site-wide overburden and bedrock groundwater.[3]

A thorough description of all exposure pathways evaluated in the risk assessments including estimates for an average exposure scenario, can be found in Section 6.0 of the RI and Section 3.0 of the supplemental HHRA.

Section 3: Toxicity Assessment

[3] For future residential exposures to untreated groundwater, drinking water ingestion rates of 2 L/day and 1.5 L/day for the adult and young child respectively, were assumed. An exposure frequency of 350 days/year was used for a combined exposure duration of 30 years. Dermal contact was assumed with 18,000 cm^2 of surface area for the adult, and 6,600 cm^2 for the child. Showers/baths were assumed to occur 350 days/year for 0.58 hr/day for the adult and 1 hr/day for the child. Airborne concentrations of volatile compounds released during showering/bathing were estimated using the Foster and Chrostowski shower model.

EPA assessed the potential for cancer risks and non-cancer health effects.

The potential for carcinogenic effects was evaluated with chemical-specific cancer slope factors (CSFs) and inhalation unit risk values. A weight of evidence classification is available for each chemical. CSFs have been developed by EPA from epidemiological or animal studies to reflect a conservative "upper bound" of the risk posed by potentially carcinogenic compounds. That is, the true risk calculated using the CSF is unlikely to be greater than the risk predicted. A summary of the cancer toxicity data relevant to the chemicals of concern is presented in Table G-2.

Potential for non-cancer health effects are evaluated with reference doses (RfDs) for oral exposure and reference concentrations (RfCs) for inhalation exposures. RfDs and RfCs represent an estimate (with uncertainty spanning perhaps an order of magnitude) of a daily exposure for the human population including sensitive subpopulations, that is likely to be without an appreciable risk of deleterious health effects during a lifetime. A summary of the non-carcinogenic toxicity data relevant to the chemicals of concern at the Site is presented in Table G-3.

Note that Tables G-2 and G-3 include toxicity data which has been updated since the Supplemental HHRA. COCs with updated toxicity data include trichloroethene and 1,4-dichlorobenzene. Refer to the tables and McDonough, 2011 for further information on these updates. These changes do not impact the cleanup levels.

Section 4: Risk Characterization

Risk characterization combines estimates of exposure with toxicity data to estimate potential health effects that might occur if no actions were taken.

Excess lifetime cancer risks were determined for each exposure pathway by multiplying the daily intake levels (see *Section 2: Exposure Assessment*) by the CSF or by comparison to the unit risk value. These toxicity values are conservative upper bound estimates, approximating a 95% upper confidence limit, on the increased cancer risk from a lifetime exposure to a chemical. Therefore, the true risks are unlikely to be greater than the risks predicted. Cancer risk estimates are expressed as a probability, e.g., one in a million. Scientific notation is used to express probability. One in a million risk (1 in 1,000,000) is indicated by 1×10^{-6} or 1E-06. In this example, an individual is not likely to have greater than a one in a million chance of developing cancer over a lifetime as a result of exposure to the concentrations of chemicals at a site. All risks estimated represent an "excess lifetime cancer risk" in addition to the background cancer risk experienced by all individuals over a lifetime. EPA's generally acceptable risk range for site related exposure is 10^{-4} to 10^{-6}. Current EPA practice considers carcinogenic risks to be additive when assessing exposure to a mixture of hazardous substances.

In assessing the potential for adverse effects other than cancer, a hazard quotient (HQ) is calculated by dividing the daily intake by the RfD or RfC. An HQ ≤ 1 indicates that an exposed individual's dose of a single contaminant is less than the RfD or RfC and that a toxic effect is unlikely. The Hazard Index (HI) is generated by adding the HQs for all chemical(s) of concern that affect the same target organ (e.g., liver) within or across those media to which the same individual may reasonably be exposed. An HI ≤ 1 indicates that adverse non-carcinogenic effects are unlikely for chronic exposure.

The following is a summary of the media and exposure pathways that were found to present a risk exceeding EPA's cancer risk range and non-cancer threshold at the Site. Only those exposure pathways deemed relevant to Site conditions are presented in this ROD. Readers are referred to Section 6.0 and Tables 6-31 through 6-37 of the baseline HHRA and Section 5.0 and Tables 9-1 through 9-3 of the supplemental HHRA for a more comprehensive risk summary of all exposure pathways evaluated for all chemicals of potential concern and for estimates of the central tendency risk, when calculated.

Residential Groundwater Use

Tables G-4 and G-5 depict the carcinogenic and non-carcinogenic risk summary for the chemicals of concern in future residential wells evaluated to reflect potential future potable water exposure corresponding to the RME scenario, under the assumption that on-Site groundwater migrates to potable wells installed on the Site, adjacent to, or downgradient of the Site in the future. For the future resident using untreated groundwater as household water, carcinogenic and non-carcinogenic risks exceeded the EPA acceptable risk range of 10^{-4} to 10^{-6} and/or a target organ HI of 1 for groundwater. The exceedances were due primarily to the presence of 1,2-dichloroethane, 1,4-dichlorobenzene, benzene, carbon tetrachloride, cis-1,3-dichloropropene, tetrachloroethene, trichloroethene, vinyl chloride, atrazine, bis(2-chloroethyl)ether, dibenz(a,h)anthracene, dieldrin, arsenic, cadmium, lead, and manganese in Site groundwater.

Section 5: Uncertainties

The process of evaluating human health cancer risks and non-cancer hazard indices involves multiple steps. Inherent in each step of the process are uncertainties that ultimately affect the final cancer risks and non-cancer hazard indices. Uncertainties may exist in numerous areas. Sources of uncertainty in the HHRA include:

- Exposure Assessment.
  - o Inhalation of volatile contaminants released during household water use was assumed for the future scenario. Modeling used to estimate concentrations of volatile contaminants released to indoor air during

showering using conservative assumptions. Modeling did not address other household water uses which may underestimate risks.

- o Dermal absorption of volatile contaminants when water is used for bathing was assumed using conservative exposure assumptions. The absorption of contaminants through the skin is based on a predictive model for most contaminants. The modeled absorption estimates are not available for all contaminants of concern. Dermal absorption while bathing may be over or underestimated.
- o The parameter values used to describe the extent, frequency, and duration of exposure were selected to produce an upper-bound estimate of exposure in accordance with USEPA guidance regarding evaluation of potential exposures at Superfund sites. Exposures and estimated potential risks are likely to be overestimated.

- Toxicity Assessment
  - o There is uncertainty associated with all toxicity values. However, the CSFs were developed to represent plausible upper bound estimates, which means that EPA is reasonably confident that the actual cancer risk will not exceed the estimated risk calculated using the CSF.
  - o The toxicity values for 2 contaminants of concern are under review by EPA's Integrated Risk Information System (IRIS) program. Toxicity assessments for trichloroethene and tetrachloroethene are currently under review. Changes to toxicity assessments for these contaminants, as well as all others, will be reviewed periodically to ensure that the cleanup goals for groundwater are protective.
- For dermal exposure pathways, the absence of dermal toxicity criteria necessitated the use of oral toxicity data. A default absorption of 100% was assumed except when oral bioavailability factors were available to modify the oral toxicity criteria. The risk estimates for the dermal pathways may be over- or underestimated.

2. Ecological Risk Assessment

Investigational activities for the Site, including a baseline ecological risk assessment (BERA), were completed for OU3 in 1997. At the time of the FS for OU3, completed in 2004, it was decided that site-wide surface water, sediment, and groundwater required additional investigation and the OU3 FS was then limited to Site source areas. Therefore, OU4 includes residual groundwater, surface water, and sediment contamination following the source control measures that will be implemented for OU3. Based on the results of the OU3 BERA, additional investigative activities were undertaken in Site wetlands and ponds to support the preparation of a focused Ecological Risk Assessment/Wetland Remedial Investigation Addendum (ERA/WRIA; M&E, 2006). The OU4 ERA/WRIA was prepared as an addendum to the BERA conducted for OU3 (M&E, 1997) and focused on the evaluation of potential risks to receptors identified in the 1997 OU3 BERA. This included risks to aquatic receptors to target metals in surface water, risks to benthic invertebrates exposed to COCs in sediment within the on-site wetland and ponds, and risks to predatory birds (e.g., great blue heron) exposed via their dietary consumption of COC-contaminated fish from on-site habitats.

Section 1: Identification of Chemicals of Concern

The 1997 OU3 BERA identified potential risk to ecological receptors from direct contact exposure to surface soils, site-wide sediment, and surface water; and indirect dietary exposure of semi-aquatic piscivorous birds through ingestion of COC-contaminated prey. The proposed remedy for OU3 (source control via capping and/or excavation) for upland soil areas is expected to eliminate, or make incomplete, the exposure pathways for terrestrial receptors. As a result, no terrestrial receptors were identified for further evaluation as a part of the OU4 ERA/WRIA.

Chemicals of Concern (COCs) first identified in the 1997 BERA were selected using surface water and sediment data from 1993, and were later refined in the ERA/WRIA based on data collected in 2004. Sediment and surface water samples were collected at 46 locations site-wide in June 1993 and a second round of surface water samples were collected in September 1993. Data were summarized by medium and grouped by habitat areas identified as major ecological exposure areas across the Site. The maximum contaminant concentrations in each medium for each area of concern were compared to risk-based, screening-level ecological benchmarks for the combined dataset for each of the exposure groups and any that were below the selected benchmarks were eliminated (screened out) from further evaluation. In addition, the COCs detected in 5% or fewer of the samples were eliminated from further assessment.

The COCs in sediment identified in the BERA that were carried forward to the ERA/WRIA included PAHs, pesticides, and metals. In the BERA, the analysis and selection of COCs in surface water were based on measurement of total concentrations of metals (unfiltered samples), because dissolved (filtered) metal analysis for surface water was not routinely done at the time of the 1993 data collection. The primary COCs in surface water were metals, which were re-sampled and further evaluated in the ERA/WRIA based on both total and dissolved metals.

The refinement of COCs in the ERA/WRIA identified COCs based on supplemental samples collected in 2004 (M&E, 2006). Data used to identify COCs are summarized in Table G-6 (OU4 surface water) and Table G-7 (OU4 sediment). The COCs identified in surface water included dissolved metals (barium and manganese) and total aluminum based on exceedances of benchmarks (Table G-6). COCs identified in sediment included PAHs, dibenzofuran, 4,4'-DDD, several PCB Aroclors (1242, 1254, and 1260), and inorganics including arsenic, barium, chromium, copper, lead, manganese, vanadium, and zinc (Table G-7). The majority of the maximum concentrations were detected in sediments from B&M Pond. Chemical data collected in 2004 were compared in the ERA/WRIA with earlier data and found to show similar magnitude of contaminant concentrations and distribution of contaminants across the Site.

Section 2: Exposure Assessment

The Site occupies approximately 553 acres in North Billerica, Massachusetts, near the Tewksbury town line, approximately 20 miles northwest of Boston. OU4 includes site-wide surface water, sediment, and groundwater (not related to Shaffer Landfill), and addresses the areas within the OU3 site boundaries where ecological risks were identified in the 1997 BERA (i.e., on-site surface water and sediment in wetland habitats). The Site is bounded on the north by the B&M railroad tracks, on the west by High Street and an auto salvage yard, on the east by Gray Street, and on the south by a wetland, Pond Street, and the Middlesex Canal (Figure E-2). The Middlesex Canal flows through the site west to east, where it joins Content Brook near the site border and southeastern edge of the Shaffer Landfill. Content Brook flows to the Shawsheen River and ultimately to the Merrimack River to the north. There are abundant wetlands and forested upland habitat areas on site. Approximately 20% of the Site is forested upland while 17% is either emergent and scrub-shrub or forested wetland habitat. In addition, several large wetland complexes border the Site which increases the total acreage of the wetlands on and in the vicinity of the Site to 266 acres.

Based on consultation with U.S. Fish and Wildlife Service there are no federally-listed proposed, threatened or endangered species or critical habitat in the project area (M&E, 2006). Consultation with Massachusetts Natural Heritage and Endangered Species Program (MNHESP) indicated the potential occurrence of blue-spotted salamander (*Ambystoma laterale*) habitat in the vicinity of the Site. However, based on the habitat characterization in the 2006 ERA/WRIA, no vernal pools occur on site. Therefore, this MNHESP species of concern is not likely to occur due to the lack of this critical habitat.

For the purpose of exposure assessment, the aquatic habitats on site were divided into five exposure areas in the 1997 BERA. They included: West Middlesex Canal, Wetland 2 (Unnamed Brook and associated wetlands including B&M Pond), East Middlesex Canal, Richardson Pond, and Content Brook Wetland.

Chemicals identified in the 1997 BERA with maximum detected concentrations exceeding screening criteria were evaluated in the 2006 ERA/WRIA (Tables G-6 and G-7). The evaluation of ecological risk to receptors in aquatic habitats in the 1997 BERA identified minimal risks from surface water in the Middlesex Canal. However, the evaluation indicated the potential for adverse effects on aquatic populations as a result of the observed risks of metals in surface water in the Wetland 2 (barium, iron, and lead), Richardson Pond (barium, iron, and lead), and Content Brook Wetland (barium, aluminum, arsenic, iron, manganese, and silver).

Risk to benthic macroinvertebrate receptors from exposure to COC-contaminated sediment in Middlesex Canal indicated risks from semi-volatile organic compounds (SVOCs), copper, lead, PCBs, and 4,4'-DDD. Sediment risk to benthic macroinvertebrate receptors is also a result of sediment PAHs and metals in Wetland 2, Richardson Pond, and Content Brook Wetland.

A potential for adverse effects on piscivorous bird populations in Wetland 2, Richardson Pond, and Content Brook Wetland was identified from exposure to COCs in their prey (forage fish) with uptake modeled from sediment data. Risks to piscivorous birds was principally from dietary exposures to tissue metals and SVOCs (particularly dibenz(a,h)anthracene).

Complete exposure pathways were identified and evaluated further in the 2006 ERA/WRIA based on the results of the 1997 BERA and an updated conceptual site model. Consistent with the updated conceptual site model, exposure pathways, exposure routes, assessment endpoints, and measures of effect are summarized in Table G-8.

Section 3: Ecological Effects Assessment

The assessment endpoints and measures of effect identified in Table G-8 were evaluated in the ERA/WRIA to assess the potential adverse ecological effects of exposure to COCs in on-site surface water and sediment. In aquatic habitats, the assessment endpoints included sustainability of local populations of aquatic (water column) invertebrates, warmwater fish, benthic invertebrates, and wildlife (great blue heron) exposed to COCs in the aquatic environment.

Supplemental sampling in 2004 included additional chemical analysis of surface water and sediment, toxicity testing of surface water and sediment, and fish tissue analysis. Surface water samples were collected from one reference area (Round Pond) and four surface water areas on-site including the Middlesex Canal, Richardson Pond, B&M Pond, and Content Brook. These samples were used to evaluate toxicity to aquatic receptors from exposure to target metals in surface water. The measures of effect for exposure to surface water included comparisons of chemical concentrations to effects-based benchmarks and laboratory toxicity tests of surface water conducted on daphnid zooplankton *(Ceriodaphnia dubia)* and fathead minnow (*Pimephales promelas*) (Table G-8).

Fish tissue samples were also collected at these five open water locations (four on-site and one reference) and residue levels of the COCs measured in fish tissue were compared to published critical body residue (CBR) screening-level benchmarks. The COCs measured in fish tissue were also used to model dietary exposure of and risk to heron from their feeding on fish contaminated by PAHs and metals. The daily dose based on dietary assumptions (diet composed of 100% fish) was compared to published Toxicity Reference Values (TRVs) for chronic and acute exposures for both no observed adverse effects level (NOAEL) and lowest observed adverse effects level (LOAEL) concentrations.

Sediment samples were collected to evaluate effects on benthic invertebrates from exposure to 4,4'-DDD, PCBs, PAHs, and metals in sediment within the on-site wetlands and ponds. The samples were collected in a phased approach. Based on historic data and site reconnaissance, 20 on-site locations and three reference locations were sampled for sediment chemistry for metals, PAHs, and PCBs, and sediment toxicity using the Microtox® Toxicity Analyzer (Phase I screening). Based on the field-screening results, a subset of four on-site sediment locations was sampled to represent those sediments with highest potential toxicity for Phase II definitive testing. The least toxic/contaminated location among the three potential reference locations was selected for analysis as the representative reference location in the definitive test. The five sediment samples (four site and one reference location) were then evaluated using laboratory sediment toxicity test methods (Table G-8). These Phase II data, in conjunction with historic data and field-screening Phase I results, were used in the 2006 ERA/WRIA to assess the risk of COC-contaminated sediment to benthic invertebrate receptors (Table G-8).

Section 4: Risk Characterization

Conclusions of the risk characterization in the 2006 ERA/WRIA were based on an evaluation of the combined 1993 and 2004 chemistry and toxicity data, along with supporting sediment toxicity patterns of the Microtox® Toxicity Analyzer and previous evaluations of the 1997 BERA. There was no indication in the risk characterization of unacceptable ecological risk to aquatic life (aquatic invertebrates and warmwater fish exposed to surface water) or predatory (piscivorous) birds on-site (Table G-9). Sediment toxicity was low in West Middlesex Canal and Content Brook, so risk to benthic invertebrate populations is low on the boundary of the Site at these locations and do not represent an unacceptable ecological risk.

There is a risk to benthic invertebrate populations, particularly in Unnamed Brook and B&M Pond, due to sediment PAHs, 4,4'-DDD, PCBs, and metals. A conclusion of unacceptable risk to benthic invertebrates at these locations is supported by the combined chemistry data, toxicity data, and magnitude of the risk. Table G-10 presents the list of sediment COCs in the Unnamed Brook and B&M Pond that pose an unacceptable ecological risk to benthic invertebrate populations.

In the context of the surface water hydrology of the Site, unacceptable sediment risks in Unnamed Brook and B&M Pond are situated upstream in depositional environments. Sediments downstream of these do not pose an unacceptable risk. This spatial distribution pattern of contaminant concentrations and associated sediment toxicity supports an interpretation that the site-related COCs are likely to have been transported short distances downstream as sediment-bound particles and settled or re-deposited in depositional environments along the Unnamed Brook or in areas of B&M Pond. The significance of the spatial distribution of sediment PAHs and metals on-site in relation to surface water hydrology is that the COCs have apparently migrated downstream as particle-bound contaminants to become deposited and sequestered by site wetlands and B&M Pond. Moreover, they have not migrated further downgradient to Content Brook or off-site, so may be considered sequestered.

Section 5: Uncertainties

Ecological risk assessments are subject to a variety of uncertainties as the result of the assumptions used to organize the data into receptor exposure areas based on site conditions and existing habitats. Moreover, there is variability in the media contamination, receptor exposure, and toxicological response. As a result, the assessment must estimate or infer the information concerning individuals to characterize risks or reach a conclusion about risk at the population level.

Both the 1997 BERA and the 2006 ERA/WRIA provide detailed evaluation of potential sources of uncertainty in the risk characterization. Uncertainty associated with the site conceptual model includes assumptions about the sources and the fate and transport of contaminants at the Site. The Site has a complex history and several potential source areas. This resulted in a mixture of contaminants, and combined with the location of the Site in an urban watershed, there is the confounding issue of potential for off-site sources of contaminants potentially contributing to exposure concentrations measured in on-site samples. However, the number of samples collected within the Site provides reasonable confidence in the identification of COCs, and estimation of exposure from surface water and sediment. In addition, examination of patterns of contaminant concentrations and utilization of reference areas provided a mechanism for evaluating the sources of common contaminants. Even with multiple sampling rounds, there is some uncertainty in the sampling design since there is large spatial variability in the distribution of sediment contaminants.

Another step in the 2006 ERA/WRIA that contributes to the uncertainty in the risk evaluation is that the sediment and surface water toxicity testing was conducted at only four locations across the Site. Although the number of toxicity testing locations was limited, these locations were carefully selected based on field screening for metals, PAHs, PCBs and sediment toxicity using the Microtox® Toxicity Analyzer. The study design incorporates the assumption that similar levels of contaminants at two different locations will show similar level of effects. There is uncertainty in this assumption since there are environmental factors that may modify the toxicity of one or more COCs at different locations with similar contaminant concentrations.

Exposure estimates used in the heron model are a source of uncertainty in the risk assessment. The model included the assumption that 100% of the heron diet was comprised of fish, although heron may also feed on other prey such as crayfish and amphibians. Since the majority of the diet of at great blue heron is usually fish, this is unlikely to be a source of major error in estimating exposure. The collection of site-specific fish tissue data for the 2006 ERA/WRIA increased the confidence in the estimate of dietary exposures in these models. Using the maximum detected tissue concentrations resulted in a conservative estimate of exposure in the dietary modeling. The approach in the ERA/WRIA was to utilize conservative exposure parameters while maintaining a realistic evaluation of the potential for effects on the receptor species.

3. Basis for Response Action

The baseline human health and ecological risk assessments revealed that:

- A future resident using untreated groundwater as household water may be potentially exposed to compounds of concern via ingestion, inhalation or dermal exposure may present an unacceptable human health risk (exceedance of 10^{-4} cancer risk and HI of concern);
- Unacceptable ecological risks exist to benthic invertebrates in Unnamed Brook and B&M Pond sediments.

Actual or threatened releases of hazardous substances from this Site in sediment and groundwater, if not addressed, may present an imminent and substantial endangerment to public health, welfare, or the environment. A response action will be selected and implemented to address risks associated with sediment and groundwater.

H. REMEDIATION OBJECTIVES

As stated previously, the reasonable, expected, future use for the Site is industrial. The risk assessment evaluated exposure pathways associated with site workers, potential trespassers and potential future users of on-site groundwater. Ecological risks from contaminated sediment were determined to be to benthic organisms in the B&M Pond and the Unnamed Stream system. Based on preliminary information relating to types of contaminants, environmental media of concern, and potential exposure pathways, remedial action objectives (RAOs) were developed to aid in the development and screening of alternatives. These RAOs were developed to mitigate, restore and/or prevent existing and future potential threats to human health and the environment (the basis for the RAOs is discussed in Section 2 of the FS). The RAOs for the selected remedy for OU4 are:

<u>Human Health</u>

- Groundwater - For the protection of potential human receptors, prevent exposure to groundwater impacted by site contaminants at concentrations that exceed State or Federal drinking water standards (MMCLs or MCLs). For contaminants where no State or Federal drinking water standard has been established, prevent exposure to concentrations which exceed human health risk-based levels. For contaminants that are a concern with respect to vapor intrusion, prevent exposure to indoor air concentrations that are not protective of human health;

Ecological
- B&M Pond – Prevent exposure of benthic invertebrates to levels of COCs indicative of adverse effects.
- Unnamed Brook and additional unnamed waterway (near Site entrance as shown on Figure L-1) Prevent exposure of benthic invertebrates to levels of COCs indicative of adverse effects.

More specifically, the remedy will seek:

- To reduce the potential exposure of a future resident to 1,2-dichloroethane, 1,4-dichlorobenzene, benzene, carbon tetrachloride, cis-1,3-dichloropropene, tetrachloroethene, trichloroethene, vinyl chloride, atrazine, bis(2-chloroethyl)ether, dibenz(a,h)anthracene, dieldrin, arsenic, cadmium, lead, and manganese in groundwater via household use, that may present a human health risk in excess of 10^{-4} cancer risk, or a HI>1 such that the cancer and non-cancer risk attributable to this medium are within the range of 10^{-4} to 10^{-6} and a HI which does not exceed one and complies with ARARs and EPA TBC risk guidances.

- To reduce the potential exposure of benthic invertebrates to PAHs, PCBs, 4,4 DDD, chromium, copper, lead, vanadium, and zinc in Unnamed Brook and B&M Pond sediments above site specific cleanup levels, that may present an ecological risk in excess of MATC calculated values such that the ecological risk attributable to this medium meets risk standards developed from ARARs and EPA TBC guidances.

I. DEVELOPMENT AND SCREENING OF ALTERNATIVES

A. Statutory Requirements/Response Objectives

Under its legal authorities, EPA's primary responsibility at Superfund sites is to undertake remedial actions that are protective of human health and the environment. In addition, Section 121 of CERCLA establishes several other statutory requirements and preferences, including: a requirement that EPA's remedial action, when complete, must comply with all federal environmental standards, requirements, criteria, or limitations and more stringent state environmental and facility siting standards, requirements, criteria or limitations, unless a waiver is invoked; a requirement that EPA select a remedial action that is cost-effective and that utilizes permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable; and a preference for remedies in which treatment which permanently and significantly reduces the volume, toxicity or mobility of the hazardous substances is a principal element over remedies not involving such treatment. Response alternatives were developed to be consistent with these statutory mandates.

B. Technology and Alternative Development and Screening

CERCLA and the National Contingency Plan (NCP), 40 CFR Part 300, set forth the process by which remedial actions are evaluated and selected. In accordance with these requirements, a range of alternatives were developed for OU4 of the Site.

With respect to source control (sediment), the RI/FS developed a range of alternatives in which treatment that reduces the toxicity, mobility, or volume of the hazardous substances is a principal element. This range included alternatives that remove or destroy hazardous substances to the maximum extent feasible, eliminating or minimizing to the degree possible the need for long term management.

As discussed in Section 2 of the FS, sediment treatment technology and source control options were identified, assessed and screened based on implementability, effectiveness, and cost. Remedial technologies that were not screened from further evaluation were developed into site specific remedial alternatives for sediment and presented in Section 3 of the FS.

For groundwater, a similar screening evaluation took place. However, as the RAOs for groundwater in part involve ensuring that there is no exposure to on-site groundwater within the compliance boundary established for the Site and that migration does not occur beyond the compliance boundary, the response actions evaluated involved monitoring and institutional controls, such as deed restrictions, to prevent exposure on-site and migration beyond the compliance boundary. Similar to sediment, actions that were not screened from further evaluation were developed into site specific remedial alternatives and presented in Section 3 of the FS.

Section 4 of the FS provides an initial screening of the site specific remedial alternatives which were presented in Section 3. Retained remedial alternatives are evaluated in detail in Section 5 of the FS. As there are only two remedial alternatives related to groundwater (GW-1: No Action and GW-2: Limited Action), screening was not performed and both alternatives have been retained for detailed evaluation.

J. DESCRIPTION OF ALTERNATIVES

This Section provides a narrative summary of each sediment and groundwater alternative evaluated.

Sediment Alternatives Analyzed

The sediment alternatives analyzed at the Site are summarized below. A more complete, detailed presentation of each alternative is found in Section 5 of the FS. Tables J-1, J-2, and J-3 present a detailed analysis of these alternatives compared to each required evaluation criteria.

SD-1: No Action

Alternative SD-1 is the "No Action" alternative required by the NCP and EPA's feasibility study guidance (U.S. EPA, 1988). No remedial actions (including monitoring) would be conducted under this alternative. Five-year reviews of the remedy would still be required by CERCLA, because of waste being left in place.

SD-4: Source Control - Excavation (B&M Pond) with Disposal and Monitored Natural Recovery of the Unnamed Brook/Other Areas Outside of the Excavation Area

This alternative would involve excavating an estimated 7,400 cubic yards of contaminated sediments in B&M Pond through either dredging or dry excavation techniques. Pre-design sampling would be performed to determine/define both horizontal and vertical extent of the excavation area, as well as to provide a baseline for the evaluation of the progress of MNR processes in Unnamed Brook (and other areas outside of the excavation). Wetland mitigation due to disturbance during excavation would be performed, including replacement of excavated sediments with appropriate clean fill. Following dewatering, sediments would be transported to an off-site disposal facility, or possibly moved to an on-site area (*e.g.*, one of the OU3 AOCs) and placed under a cap. There are currently capping operations ongoing at the Site as part of OU3. Depending on timing of cap design/construction for those on-site areas, use of this option may be limited. If on-site disposal is available, it is the most cost effective means of disposal. Areas/residuals outside of the excavation, including within the Unnamed Brook, would be monitored as part of an MNR program and subject to Institutional Controls (ICs) to prevent disturbance of the contaminated sediments until cleanup standards are achieved. If the MNR process results in the natural covering of contaminated sediments (without any reduction in toxicity below ecological risk levels) ICs would be retained to permanently prevent disturbance of the covered contaminated sediments. There is a decreasing contaminant level trend in the sediment in the Unnamed Brook over an 11 year period. This trend data was used as the input for the "time to achieve prg" calculation. Furthermore, the conceptual site model supports that MNR is an appropriate remedy in this area particularly if supplemented by the implementation of stormwater controls. Storm water runoff controls (such as curbing/berms and filters) would also be implemented to prevent sediment recontamination. ICs would ensure that the storm water controls remain in place and function as designed until no longer needed to support the remedial action. The time to achieve sediment cleanup levels is estimated at less than 20 years. Five-year site reviews would be conducted to evaluate the remedy per statutory requirements as long a sediment exceeding ecological risk level remains on-site (whether at the surface or underneath any natural cover that develops during the MNR period).

Estimated Time To Achieve Cleanup Levels: Less than 20 years

Estimated Cost: $4.1 million

SD-6: Source Control - Excavation (B&M Pond and Unnamed Brook) with Disposal

This alternative is similar to Alternative SD-4, except that excavation would also include Unnamed Brook and all other waterways where contaminated sediments exceed ecological risk levels, such that an MNR monitoring program would not be necessary. Pre-design sampling would be performed to determine/define both horizontal and vertical extent of the excavation area. The estimated volume to be excavated is 10,575 cubic yards. Wetland mitigation due to disturbance during excavation would be performed, including replacement of excavated sediments with appropriate clean fill. Following dewatering, sediments would be transported to an off-site disposal facility, or possibly moved to an on-site area (*e.g.*, one of the OU3 AOCs) and placed under a cap. Depending on timing of cap design/placement for those on-site areas, use of this option may be limited. Storm water runoff controls (such as curbing/berms and filters) would also be implemented to prevent sediment recontamination. ICs would ensure that the storm water controls remain in place and function as designed until no longer needed to support the remedial action.

Estimated Time To Achieve Cleanup Levels: 5 years

Estimated Cost: $5.4 million

<u>Groundwater Alternatives Analyzed</u>

The groundwater alternatives analyzed at the Site are summarized below. A more complete, detailed presentation is found in Section 5 of the FS. Tables J-5 and J-6 present a detailed analysis of these alternatives compared to each required evaluation criteria.

GW-1: No Action

Alternative GW-1 is the "No Action" alternative required by the NCP and EPAs feasibility study guidance (U.S. EPA, 1988). No remedial actions (including monitoring) will be conducted in relation to the site-wide groundwater under this alternative[4]. Uncontrolled groundwater contamination may still exist and no measures would be taken to prevent use of this groundwater, limit the extent of the contamination, or identify changes in the extent of the contamination. Five-year reviews of the remedy would still be required by CERCLA, because of waste being left in

[4] Groundwater use would still be restricted under the Site's waste management areas as part of OU3.

place.

GW-2: Limited Action

Under this alternative, groundwater monitoring would be utilized to confirm that contaminants do not migrate beyond the compliance boundary established under the OU4 remedy that encompasses the OU3 waste management areas and areas of the Site classified as non-potential drinking water source areas by the State underlying the railyard, and small inclusions of areas of the Site classified as potential drinking water source areas by the State. As discussed in the Preamble to the NCP, when the source of groundwater contamination is from several potential distinct sources in close geographic proximity, such as exists within the Site, EPA may draw a single compliance boundary to encompass the sources of potential release considering factors including the proximity of the sources and the technical practicability of groundwater remediation at the Site (55 FR 8753). Within the Site the OU3 waste management areas and State classified areas of non-potential drinking water are in close proximity so that one compliance boundary to encompass all of the areas is warranted. Small areas of potential drinking water located between and adjacent to the waste management areas within the designated compliance boundary cannot be practicably developed for groundwater use due to the impacts of the wastes permanently in place within the waste management areas on the potential drinking water source areas, so there is no practicability to remediating the areas.

ICs would be implemented to restrict groundwater use on Site within the compliance boundary, and to prevent installation of wells within a groundwater buffer zone, which extends beyond the compliance boundary to the Site boundary or 150 meters, whichever distance is smaller. The buffer zone will prevent the installation of wells on the edge of the compliance zone that could draw contaminated groundwater beyond the compliance boundary. Compliance monitoring will ensure ICs remain in effect and are enforced. Performance standards established under the ROD based on federal and State drinking and groundwater standards require that monitoring be conducted to document that groundwater contamination is not migrating beyond the compliance boundary. If Performance Standards are exceeded in one or more compliance monitoring wells, site conditions will be re-evaluated to determine if additional measures might be warranted. Five-year reviews of the remedy would still be required by CERCLA, because of waste being left in place.

The major components of this alternative include monitoring well installation and maintenance, environmental monitoring, ICs, and five-year reviews.

K. SUMMARY OF THE COMPARATIVE ANALYSIS OF ALTERNATIVES

Section 121(b)(1) of CERCLA presents several factors that at a minimum EPA is required to consider in its assessment of alternatives. Building upon these specific statutory mandates, the

NCP articulates nine evaluation criteria to be used in assessing the individual remedial alternatives.

A detailed analysis was performed on the alternatives using the nine evaluation criteria in order to select a remedy for OU4 of the Site. The following is a summary of the comparison of each alternative's strengths and weaknesses with respect to the nine evaluation criteria. These criteria are summarized as follows:

Threshold Criteria

The two threshold criteria described below must be met in order for the alternatives to be eligible for selection in accordance with the NCP:

1. **Overall protection of human health and the environment** addresses whether or not a remedy provides adequate protection and describes how risks posed through each pathway are eliminated, reduced or controlled through treatment, engineering controls, or institutional controls.

2. **Compliance with applicable or relevant and appropriate requirements (ARARs)** addresses whether or not a remedy will meet all Federal environmental and more stringent State environmental and facility siting standards, requirements, criteria or limitations, unless a waiver is invoked.

Primary Balancing Criteria

The following five criteria are utilized to compare and evaluate the elements of one alternative to another that meet the threshold criteria:

3. **Long-term effectiveness and permanence** addresses the criteria that are utilized to assess alternatives for the long-term effectiveness and permanence they afford, along with the degree of certainty that they will prove successful.

4. **Reduction of toxicity, mobility, or volume through treatment** addresses the degree to which alternatives employ recycling or treatment that reduces toxicity, mobility, or volume, including how treatment is used to address the principal threats posed by the site.

5. **Short term effectiveness** addresses the period of time needed to achieve protection and any adverse impacts on human health and the environment that may be posed during the construction and implementation period, until cleanup goals are achieved.

6. **Implementability** addresses the technical and administrative feasibility of a remedy,

including the availability of materials and services needed to implement a particular option.

7. **Cost** includes estimated capital and Operation Maintenance (O&M) costs, as well as present-worth costs.

Modifying Criteria

The modifying criteria are used as the final evaluation of remedial alternatives, generally after EPA has received public comment on the RI/FS and Proposed Plan:

8. **State acceptance** addresses the State's position and key concerns related to the preferred alternative and other alternatives, and the State's comments on ARARs or the proposed use of waivers.

9. **Community acceptance** addresses the public's general response to the alternatives described in the Proposed Plan and RI/FS report.

COMPARISON OF SEDIMENT AND GROUNDWATER CLEANUP ALTERNATIVES

Following the detailed analysis of each individual alternative, a comparative analysis, focusing on the relative performance of each alternative against the nine criteria, was conducted. This comparative analysis can be found in Section 6 of the FS, as well as graphically in Tables J-8 and J-9 which are also attached to this ROD.

The section below presents the nine criteria and a brief narrative summary of the alternatives and the strengths and weaknesses according to the detailed and comparative analyses. Only those alternatives which satisfied the first two threshold criteria were balanced and modified using the remaining seven criteria.

Discussed briefly below are the relative strengths and weaknesses of the cleanup alternatives considered for groundwater and sediment. The cleanup alternatives are compared against the list of nine evaluation criteria that were described earlier. Of these, the criteria for *State Acceptance* and *Community Acceptance* are evaluated after the public comment period.

SEDIMENT

Table J-9 presents a summary of the primary evaluation factors and a comparative assessment of the alternatives evaluated for sediments in Unnamed Brook and B&M Pond. The alternatives for remediation of sediment include:

- No Action;
- Source Control – Excavation (B&M Pond) with Disposal and Monitored Natural Recovery of the Unnamed Brook/Other Areas Outside of the Excavation Area; and
- Source Control – Excavation (B&M Pond and Unnamed Brook) with Disposal.

In the following comparative analysis, the second alternative will be classified as the "Partial Excavation/MNR" alternative, while the third alternative will be classified as the "Full Excavation" alternative.

Overall Protection of Human Health and the Environment

Overall protection of human health and the environment, within the limits of the remedial action objectives defined for the feasibility study, is a key threshold criterion that must be attained by an alternative to be eligible for selection in the ROD. This section describes the overall assessment of whether each alternative achieves adequate protection of human health and the environment.

Human Health Protection. There are no unacceptable human health risks noted to be associated with the site sediment.

Ecological Protection. As noted in Section G, there are potential ecological risks due to PAHs, PCBs, pesticides, and metals in sediment. The No Action alternative would not be protective of the environment, since risks posed by the contaminated sediment would not be addressed. The Full Excavation alternative would be protective of ecological receptors since contaminated sediments exceeding ecological risk levels will be removed. The Partial Excavation/MNR alternative will be fully protective once sediment cleanup standards are achieved in an estimated period of less than 20 years.

Primary ARARs associated with ecological protection include federal and state wetlands and floodplains standards. The No Action alternative does not address the contamination which has degraded the wetlands; however, it also does not include remedial activities which would require further mitigation due to wetland and floodplain impacts. The two excavation alternatives would both address the contamination which has degraded the wetlands, as well as mitigate wetland and floodplain impacts derived from implementation of the remedy. The Partial Excavation/MNR alternative provides a balance of removing the most contaminated sediments on Site while not disturbing the existing wetlands that are less contaminated and more suitable to MNR. The Full Excavation alternative will have more short term impacts, but all disturbed areas will be restored once the contamination is fully removed.

Compliance With ARARs

The No Action alternative fails to address chemical-specific To Be Considered criteria used to evaluate ecological risk. Under the Partial Excavation/MNR alternative, these criteria would be complied with following completion of the MNR program (i.e., achievement of cleanup levels/natural covering of contaminated sediments). Similarly, these standards would be complied with for the Full Excavation alternative upon completion of the remedy.

There are no location- or action-specific ARARs for the No Action alternative. Location-specific ARARs for the other alternatives pertain to wetland and floodplain resources, as well as historical resources (e.g., Middlesex Canal), that may be affected by monitoring and excavation activities. There also are location-specific standards for consultation on fish and wildlife impacts from the remedial activities. The Partial Excavation/MNR alternative has been determined to be the Least Environmentally Damaging Practicable Alternative (LEDPA) under the federal Clean Water Act since it provides the best balance between excavating the most highly contaminated sediments (with restoration afterwards) and leaving wetland systems with less contamination undisturbed, allowing natural processes to reduce sediment contamination to below cleanup levels. While the Full Excavation alternative does meet federal and state wetland standards, it relies on restoration to address the short-term impacts resulting from the full excavation of all contaminated sediments.

Both excavation alternatives will comply with Action-specific ARARs for the implementation of sediment removal. Both excavation alternatives utilize TSCA risk-based standards for establishing PCB cleanup levels for the contaminated sediments and for managing PCB-contaminated sediments during dredging, passive dewatering, and on-site handling prior to disposal. Specific action-specific standards address water quality protection, dust control and waste characterization and disposal standards. .

Long-Term Effectiveness and Permanence

This section summarizes the evaluation for risks remaining at the site after RAOs have been met, and for risks from management of residuals.

Magnitude of Residual Risk: Human Health. There are no unacceptable human health risks associated with the site sediment.

Magnitude of Residual Risk: Ecological. The residual risk will remain similar to current conditions under the No Action alternative. The Partial Excavation/MNR alternative would significantly reduce ecological risks for B&M Pond sediment, where achieving cleanup levels would reduce residual risk to acceptable levels. Outside of this excavation (including Unnamed Brook), the residual risk is expected to be reduced to acceptable levels over time (currently assumed to be less than 20 years; see Appendix B) as the cleanup levels are approached/achieved via MNR. The Full Excavation alternative would significantly reduce ecological risks for B&M

Pond and Unnamed Brook sediment upon completion of the sediment removal, where achieving cleanup levels would reduce residual risk to acceptable levels.

Reduction of Toxicity, Mobility and Volume Through Treatment

This section provides a comparison of the alternatives selected; quantities of waste materials to be remediated; expected reductions in toxicity, mobility and volume; and residuals following treatment alternatives.

The excavation alternatives evaluated may utilize limited treatment processes, if water treatment of dewatering fluids or runoff, or stabilization of excavated sediments prior to disposal is required.

Short-Term Effectiveness

The effectiveness of each remedial alternative during construction and implementation are compared to one another in the following paragraphs.

Protection of Community and Workers During Remedial Actions. Short-term risks include any additional risks to the community or workers at the site from exposures to contaminants as a result of construction measures and implementation of remedial activities. There will be no additional short-term risks from exposures under the No Action alternative.

Short-term community risks associated with environmental monitoring for the two excavation alternatives would be minor. However, off-site sediment disposal will result in increased local truck traffic (an estimated 200-350 truckloads over one month may be necessary for the Partial Excavation/MNR alternative. The Full-Excavation alternative would require an additional estimated 80-160 truckloads due to additional contaminated sediment).

Workers at the Site will use appropriate PPE to mitigate any potential risks from exposures to sediment contaminants during any monitoring and excavation activities.

Environmental Impacts. The remedial technologies evaluated differ in the magnitude of the potential impacts to natural habitats. There would be no short-term habitat impacts resulting from the No Action alternative. Short-term, minor impacts to ecological habitat due to sediment monitoring as part of an MNR program would occur for the Partial Excavation/MNR alternative. Additional short-term impacts to ecological habitat would occur as part of the excavation component of both excavation alternatives. The Full-Excavation alternative would have greater short-term impacts due to the larger area of wetlands disturbance, but wetland mitigation would be performed in impacted areas.

Time Until Remedial Action Objectives are Achieved. The No Action alternative would not achieve RAOs. For the Partial Excavation/MNR alternative, achieving RAOs associated with sediment exposure to ecological receptors would be limited by MNR occurring in areas outside of the B&M Pond excavation. Based on available monitoring data, it is assumed that RAOs would be achieved in less than 20 years. For the Full Excavation alternative, RAOs for sediment would be achieved upon removal of contaminated sediment. This is assumed to be less than five years.

Implementability

- The No Action alternative has the highest degree of overall implementability
- Both excavation alternatives have a moderate/high degree of implementability

In general, more complex remedial technologies are more difficult to implement and will have lesser degrees of overall implementability compared to other, less complex, alternatives. As a result, the No Action alternative is the most implementable while the excavation alternatives are less implementable. Both excavation alternatives are readily implementable, however.

Sections 6.2.6.1, 6.2.6.2, and 6.2.6.3 of the FS present more detailed evaluations of the comparison of implementability characteristics of the remedial alternatives for which this analysis was performed.

Technical Feasibility. Implementability with regard to the technical feasibility of an alternative includes an evaluation of three factors: 1) ability to construct, operate and maintain the technologies, 2) the reliability of the technologies, and 3) the ease of undertaking additional remedial actions, if warranted by site conditions determined after implementation of the remedy. Each of these three factors is described for the alternatives evaluated.

Environmental monitoring used in the Partial Excavation/MNR alternative is a common practice. Monitoring to evaluate MNR in wetlands can be difficult, but still applies standard evaluation techniques. Excavation of sediments has more design and construction constraints which make the Partial Excavation/MNR and Full Excavation alternatives more difficult to implement. Although both include implementability challenges, both alternatives rely on common technology for implementation.

Access to the areas requiring excavation may be complex at the Site. In both excavation alternatives, access to B&M Pond may necessitate a roadway over the planned cap for B&M Railroad Landfill (AOC 1 of OU3). If so, care would be necessary so as to not damage the cap. Under the Full Excavation alternative, access to Unnamed Brook may be difficult in some areas and diverting the Unnamed Brook may also be necessary. Therefore, the Partial Excavation/MNR alternative is considered to be easier to implement than the Full Excavation alternative.

The reliability criterion does not apply to the No Action alternative because it includes no activity or procedures with which to assess reliability. The remaining two alternatives contain remedial technologies that can be considered "reliable" in terms of relying or counting on the day-to-day functioning of the remedy as intended. Excavation is known to be reliable, dependent on the assumption that proper construction techniques are utilized. Under the Partial Excavation/MNR alternative, MNR is expected to be reliable based on available site data. While high flow conditions can both remove contaminants as well as cover sediments, the Site streams/water bodies appear to have the physical/hydraulic characteristics that would promote the reliability of the MNR portion of that alternative.

In terms of achieving the remedial action objectives, however, the reliability of an alternative is often proportional to the greater intensity of the remedial actions contained in the alternative. Thus, the lowest reliability may be expected in the No Action alternative, while the two excavation alternatives provide a high level of reliability that the remedial action objectives can be achieved.

The ease of undertaking additional remedial actions, if warranted by future site conditions or requirements, is also proportional to the degree or intensity of each remedy. Alternatives that use more intensive remedial technologies such as containment, in-situ, or on-site treatment remedies will have the greatest difficulty in undertaking and implementing additional remedial actions. Conversely, alternatives which utilize less intensive technologies such as institutional actions can more easily implement additional remedial actions. All of the alternatives presented allow for low effort to implement additional, future remedial actions on sediments remaining at the Site.

Administrative Feasibility. The No Action alternative has the fewest administrative issues to address and only includes five-year reviews, which are easily administered. Therefore, this alternative has the highest degree of administrative feasibility. Both excavation alternatives would require approvals for disposal of contaminated sediment thereby necessitating more administrative review. Institutional controls would need to be established and maintained for the Partial Excavation/MNR alternative until no longer needed to support the remedial action, both to prevent disturbance of contaminated sediments and to protect the stormwater controls that are also a component of the alternative.

Availability of Services and Materials. Implementability with regard to the availability of services and materials includes an evaluation of three factors: 1) availability or usage of off-site treatment, storage, and disposal facilities (TSDFs), 2) availability of necessary or specialized equipment or specialist personnel needed to implement the alternative, and 3) availability of prospective technologies required by the alternative. Each of these three factors is described for the alternatives.

Both excavation alternatives would require use of off-site TSDF services, unless on-site disposal options become available. Other services and materials required to conduct the sediment excavation are relatively easy to obtain.

Cost

The No Action alternative would only incur costs for conducting five year review ($24,800). The total net present worth costs (capital plus O&M over the duration of the remedial action) for the Partial Excavation/MNR alternative is $4.1 million, while the Full Excavation alternative is $5.4 million.

State Acceptance

The Commonwealth of Massachusetts has given its support for the Partial Excavation/MNR sediment component of the selected remedy (see letter in Appendix A).

Community Acceptance

Comments pertaining to the sediment component of the proposed remedy were received by EPA during the comment period for the Proposed Plan are summarized and responded to in the Responsiveness Summary, which is Part 3 of this ROD.

GROUNDWATER

Table J-8 presents a summary of the primary evaluation factors and a comparative assessment of the alternatives evaluated for site-wide groundwater. The alternatives for remediation include:

- No Action;
- Limited Action;

Overall Protection of Human Health and the Environment

Overall protection of human health and the environment, within the limits of the remedial action objectives defined for the feasibility study, is a key threshold criterion that must be attained by an alternative to be eligible for selection in the ROD. This section describes the overall assessment of whether each alternative achieves adequate protection of human health and the environment.

Human Health Protection. As noted in Section G, there are potential human health risks due to VOCs, SVOCs, pesticides, and metals in groundwater. The No Action alternative would not be protective of human health, since risks posed by the contaminated groundwater would not be addressed. The Limited Action alternative would be protective of human health as long as ICs are enforced to prevent exposure to contaminated Site groundwater and monitoring is in place to ensure that contaminated groundwater does not migrate beyond the compliance boundary.

Ecological Protection. There are no significant ecological risks identified from the groundwater at the Site.

Compliance With ARARs

There are four EPA risk guidance documents that are To Be Considered (TBC) that establish the human health risks posed by groundwater contaminants. By not taking any action under the No Action alternative, it will not be possible to determine if the alternative achieves any of the Chemical-specific TBC standards. Under the Limited Action alternative, monitoring will be performed to ensure that groundwater exceeding risk standards does not migrate beyond the compliance boundary for the Site and ICs will ensure that there is no exposure to Site groundwater that poses a risk. The ICs for the buffer zone to the compliance boundary will insure that no wells are installed adjacent to the compliance zone that may draw out contaminated groundwater beyond the compliance boundary.

There are no location- or action-specific ARARs for the No Action Alternative. Location-specific ARARs for the Limited Action alternative pertain to wetland and floodplain resources within the area of contaminated groundwater that may be affected by monitoring well installation and operation. There also are location-specific standards for consultation on fish and wildlife impacts from the remedial activities for the Limited Action alternative. Requirements of the location-specific ARARs noted will be fulfilled.

Action-specific ARARs for the Limited Action alternative address groundwater monitoring standards under the Federal Safe Drinking Water Act and State drinking water standards to ensure that contaminated groundwater is not migrating beyond the compliance boundary and that ICs are established that prevent use of groundwater within the Site, and prevent installation of wells within a groundwater buffer zone, which extends beyond the compliance boundary to the Site boundary or 150 meters, whichever distance is smaller. The buffer zone will prevent the installation of wells on the edge of the compliance zone that could draw contaminated groundwater beyond the compliance boundary. Compliance monitoring will also ensure that ICs remain in place and are enforced.

Long-Term Effectiveness and Permanence

This section summarizes the evaluation for risks remaining at the Site after RAOs have been met, and for risks from management of residuals.

Magnitude of Residual Risk: Human Health. The residual risk will not change under the No

Action alternative. Under the Limited Action alternative residual risk will remain within the compliance zone within the Site. ICs will be protective by preventing access to the contaminated groundwater. Monitoring will ensure that Site contamination does not migrate beyond the compliance boundary for the Site.

Magnitude of Residual Risk: Ecological. Groundwater at the Site does not pose a significant ecological risk

Reduction of Toxicity, Mobility and Volume Through Treatment

This section provides a comparison of the alternatives selected; quantities of waste materials to be remediated; expected reductions in toxicity, mobility and volume; and residuals following treatment alternatives.

Neither alternative evaluated utilizes treatment processes, therefore, this criterion for treatment will not be met.

Short-Term Effectiveness

The effectiveness of the remedial alternatives during construction and implementation are compared to one another in the following paragraphs.

Protection of Community and Workers During Remedial Actions. Short-term risks include any additional risks to the community or workers at the Site from exposures to COCs as a result of construction measures and implementation of remedial activities. There will be no additional short-term risks from exposures under the No Action alternative.

The Limited Action alternative will have a nominal increase of short-term risks to the community and workers due to the installation, operation and maintenance of wells for environmental monitoring. Air sampling and monitoring will be used as necessary to evaluate any potential risks to the community from potential inhalation exposures during well installation. Concentrations of COCs are expected to be limited during monitoring activities. Contaminated media generated during well construction, maintenance, and sampling will be handled and disposed of safely according to applicable federal/state standards. Workers at the Site will use appropriate PPE to mitigate any potential risks from exposures to COCs.

Environmental Impacts. The remedial technologies evaluated differ in the magnitude of the potential impacts to natural habitats. There will be no short-term habitat impacts resulting from the No Action alternative. The Limited Action alternative will result in temporary and minor habitat impact due to monitoring well installation and maintenance. If any component of the monitoring program, including monitoring well installation and accessing monitoring locations, are within federal or state jurisdictional wetlands or floodplains, measures will be taken to minimize impacts and meet requirements of federal and state standards.

Time Until Remedial Action Objectives are Achieved. Under the No Action alternative, RAOs will not be met. Without monitoring it is not possible to assess the criteria. For the Limited Action alternative, RAOs associated with preventing direct contact exposures to groundwater by future residential receptors would be assumed to be achieved upon implementation of ICs.

Implementability

The alternatives with the highest degree of implementability would have the following characteristics from EPA's FS guidance (U.S. EPA, 1988):

- require the lowest effort to construct, operate and maintain the technologies
- include or consist only of the highest or most reliable technologies
- require the lowest effort to undertake additional remedial actions, if necessary
- include the fewest administrative hurdles for obtaining necessary permits, approvals and agreements
- rely only minimally on off-site treatment, storage, and disposal facility services (TSDFs)
- require the least amount or quantity of necessary specialized equipment and/or personnel specialists
- utilize commonly available technologies to the largest degree

Conversely, alternatives with lesser degrees of implementability will have lesser degrees of the characteristics discussed above. The first three bullets define the "technical feasibility" with regard to implementability of the alternative, the fourth bullet defines "administrative feasibility," and the remaining three bullets define the "availability of services and materials" with respect to the alternative. These three factors combine to provide the overall degree of implementability of the alternative. After evaluating all alternatives and combining the technical feasibility, administrative feasibility and availability of services and materials evaluations, the overall implementability comparison shows that both the No Action and Limited Action alternatives have a high degree of overall implementability.

In general, more complex remedial technologies are more difficult to implement and will have lesser degrees of overall implementability compared to other, less complex, alternatives. As a result, the No Action alternative is typically considered the most implementable, and any additional alternatives are less implementable. However, the Limited Action alternative is fully implementable, since monitoring and institutional controls are readily implementable remedial activities.

Sections 6.1.6.1, 6.1.6.2, and 6.1.6.3 of the FS present more detailed evaluations of the comparison of implementability characteristics of the remedial alternatives for which this analysis was performed.

Technical Feasibility. Implementability with regard to the technical feasibility of an alternative includes an evaluation of three factors: 1) ability to construct, operate and maintain the technologies, 2) the reliability of the technologies, and 3) the ease of undertaking additional remedial actions, if warranted by site conditions determined after implementation of the remedy. Each of these three factors is described for the alternatives evaluated.

The ability to construct, operate and maintain the technologies associated with each remedial alternative is proportional to the degree or intensity of each remedy. Alternatives which use more intensive remedial technologies such as containment and in-situ or on-site treatments will have the greatest difficulty in implementing construction and O&M. Conversely, alternatives which utilize less intensive technologies, such as institutional actions, will be easier to implement. The No Action alternative is easy to implement since it only requires engaging in five-year reviews. The Limited Action alternative includes active (monitoring) and administrative (institutional controls) measures that are technically feasible.

The reliability criterion does not apply to the No Action alternative because it includes no activity or procedures with which to assess reliability. The Limited Action alternative contains remedial technologies that can be considered "reliable" in terms of relying or counting on the day-to-day functioning of the remedy as intended. This assessment is dependent on the assumption that proper monitoring techniques and IC enforcement are appropriately performed.

In terms of achieving the remedial action objectives, however, the reliability of an alternative is often proportional to the greater intensity of the remedial actions contained in the alternative. The Limited Action alternative is reliable in achieving the RAO associated with preventing direct contact exposures to groundwater by future residential receptors as long as ICs are maintained and are properly enforced. Long-term monitoring can ensure that migration of contaminated groundwater beyond the compliance boundary for the Site does not go undetected.

The ease of undertaking additional remedial actions, if warranted by future site conditions or requirements, is also proportional to the degree or intensity of each remedy. Alternatives that use more intensive remedial technologies such as containment, in-situ, or on-site treatment remedies will have the greatest difficulty in undertaking and implementing additional remedial actions. Conversely, alternatives which utilize less intensive technologies such as institutional controls can more easily implement additional remedial actions. Both of the alternatives presented allow for the future implementation of additional remedial actions, if required.

Administrative Feasibility. The No Action alternative has the fewest administrative issues to address and only includes five-year reviews, which are easily administered. Therefore, this alternative has the highest degree of administrative feasibility. The Limited Action alternative has some administrative issues pertaining to establishing ICs on the numerous separate properties with different owners that exist within the Site.

Availability of Services and Materials. Implementability with regard to the availability of services and materials includes an evaluation of three factors: 1) availability or usage of off-site treatment, storage, and disposal facilities (TSDFs), 2) availability of necessary or specialized equipment or specialist personnel needed to implement the alternative, and 3) availability of prospective technologies required by the alternative. Each of these three factors is described for the alternatives.

The No Action alternative would not require the use of off-site TSDF services. The Limited Action alternative may involve the off-site disposal of contaminated media generated during well installation/maintenance or from sampling. Disposal options for any contaminated media generated are available either within or outside of EPA Region 1. Other services and materials are easy to obtain and environmental monitoring performed as part of the Limited Action alternative does not require any special technologies (although testing technologies may become more specialized over time).

Cost

The No Action alternative would only incur costs for conducting five-year reviews ($24,800). The Limited Action alternative will require O&M (environmental monitoring) in perpetuity. The total net present worth costs (capital plus O&M and periodic costs based on a 30 year period, as called for under EPA guidance) for the Limited Action alternative is $1.3 million. It should be noted that costs for both alternatives are based on a 30 year period, monitoring will be required in perpetuity since waste will remain on Site.

State Acceptance

The Commonwealth of Massachusetts has indicated its acceptance of the selected remedy for groundwater (see letter in Appendix A).

Community Acceptance

Comments received by EPA during the comment period for the Proposed Plan regarding the groundwater component of the remedy are summarized and responded to in the Responsiveness Summary, which is Part 3 to this ROD.

L. THE SELECTED REMEDY

1. Summary of the Rationale for the Selected Remedy

The selected remedy is a combination of a source control alternative which addresses ecological risks associated with sediment, and a Site use restriction and monitoring alternative that addresses groundwater at Operable Unit 4 (OU4) of Iron Horse Park.

The major components of the remedy are:

<u>For Sediment</u>

- Excavation of about 7,400 cubic yards of B&M Pond contaminated sediment
- Dewatering, transport and disposal of contaminated sediments (either off-site or on-site to an OU3 landfill)
- Treatment of dewatering fluid (if necessary), with discharge to on-site surface waters, and possible stabilization of sediment prior to disposal
- Wetland mitigation, as required.
- Monitored Natural Recovery (MNR) in Unnamed Brook and other unexcavated sediments that exceed sediment cleanup levels
- Implementing stormwater runoff controls to prevent sediment recontamination.
- Institutional Controls, (including at least yearly compliance monitoring) to protect stormwater controls and to prevent disturbance of wetlands undergoing MNR or contaminated sediments that are naturally covered under the MNR process. ICs would remain in effect until no longer needed to support the remedial action.
- Assessing cleanup protectiveness every 5 years (until sediment cleanup standards are achieved). If MNR is achieved through the natural covering of contaminated sediments 5 year reviews would be conducted for as long as contamination exceeding risk standards remains covered in place.

<u>For Groundwater</u>

- Groundwater monitoring to confirm that contaminants do not migrate beyond the compliance boundary for the Site (including the installation of new wells to supplement the existing monitoring well network);
- Institutional Controls, including at least yearly compliance monitoring, to prevent use of groundwater within the compliance zone, to prevent installation of wells in the buffer zone, and to protect components of the remedy; and
- Five-year reviews.

The sediment component of the remedy will prevent the release of contaminants from sediments in excess of cleanup standards for ecological receptors over time. The groundwater component of the remedy will ensure that there is no contact with contaminated groundwater on Site and confirm that contaminated groundwater does not migrate beyond the compliance boundary for the Site.

2. Description of Remedial Components

The selected remedy is consistent with EPA's preferred alternative outlined in the October 2010 Proposed Plan and is consistent with a combination of Alternatives GW-2 and SD-4.

Sediment Remediation

The selected remedy involves the excavation of contaminated sediments from B&M Pond which exceed the cleanup levels outlined in Section L.4.a.i. below. The general area expected to require sediment excavation is depicted on Figure L-1. The estimated volume of sediments to be excavated is 7,400 cubic yards. The vertical and horizontal extent of areas requiring excavation, the appropriate sediment excavation/dredging techniques, and specific sediment handling methods will be refined during Remedial Design. Implementation of this remedy component will likely include measures to prevent downstream migration of sediments during construction; construction of a staging area pad to temporarily stockpile excavated material prior to disposal; dewatering of area proposed for excavation (as necessary) and excavated materials, and treatment of resulting water; installing sheet-piling or other means to hydraulically isolate excavation areas from the open water portions of the wetland (if dry excavation is selected during design); replacing wetland substrate and vegetation that was removed; and restoring all areas impacted during construction, as required. It is anticipated that water resulting from dewatering (after treatment, if necessary), will be discharged back to on-site waterways.

Following dewatering, sediments will be transported for disposal. If feasible, the sediments will be placed on-site under one of the Source Areas Operable Unit 3 caps. The feasibility of on-site disposal will be dictated primarily by schedule and coordination considerations (i.e., whether the planned construction schedules for capping activities under OU3 coincide with excavation activities under this Selected Remedy). If on-site disposal is not available, the dewatered sediments would be transported to an off-site licensed disposal facility. Sampling will be required to properly characterize any material destined for off-site disposal to ensure proper handling, including conducting TCLP analyses to determine whether the sediments need to be handled as hazardous waste under RCRA. In the event that the results of waste characterization indicate that the sediments would be deemed hazardous, EPA may allow limited on-site treatment (e.g., mixing with suitable stabilization agent(s)) to render the sediments non-hazardous on-site and allow their disposal off-site as non-hazardous waste. Stabilization may also be required to meet facility standards for the sediment. During design, proposed construction methods, access points, and haul routes will be discussed and coordinated with local officials to ensure that adverse impacts on the community during construction are minimized. If off-site disposal is necessary, the potential for transporting sediments by rail will be considered.

Contaminated sediments that exceed ecological risk standards outside of the targeted B&M Pond excavation area, and particularly the Unnamed Brook sediments, are expected to recover naturally over time by Monitored Natural Recovery, via natural physical, biological, and chemical processes that will contain the spread of contamination and reduce the concentration and amount of contaminants over time or isolate contaminated sediments under naturally deposited clean sediments. Lines of evidence evaluated for these areas of sediments support the estimate that using an MNR remedy, sediment cleanup levels will be attained within approximately 20 years. Periodic sampling will be conducted to evaluate trends towards meeting cleanup levels in these areas and to ensure that MNR is progressing as expected. The ongoing effectiveness of MNR will be evaluated, at a minimum, as part of the five-year review process.

Stormwater runoff controls will be implemented to prevent recontamination of sediments by stormwater runoff draining directly into areas being addressed by the remedy, including B&M Pond and Unnamed Brook. Controls will include measures such as berms or curbing and sediment filters to remove potentially contaminated solids from stormwater prior to discharge. The specific construction details of the stormwater runoff controls will be determined during remedial design. Institutional controls will be implemented to protect the stormwater controls as well as to prevent disturbance of wetlands undergoing MNR, including potential long-term ICs to prevent disturbance of any contaminated sediment exceeding risk levels that are naturally covered through the MNR process.

Long-Term Monitoring and Five-Year Reviews

Long-term monitoring of groundwater, surface water, and sediments will be required in order to evaluate contaminant status and migration.

To address site-wide groundwater contamination, the selected remedy establishes a compliance boundary around the numerous on-site OU3 waste management areas and areas of groundwater underlying the railyard which have been classified as non-potential drinking water source areas by the State, as well as small inclusions of areas which the State has classified as potential drinking water source areas (depicted in Figure L-2). A monitoring well network will be established during Remedial Design to identify the wells that will be used to monitor the remedy's performance at this compliance boundary and to ensure that groundwater that exceeds performance standards remains contained within this area. Groundwater monitoring will be conducted to confirm that migration beyond the compliance boundary depicted in Figure L-2 has not occurred. Monitoring wells already in place for OU3 monitoring will be supplemented by additional wells, to confirm that migration has not occurred. Figure L-3 shows the areas which, at a minimum, will require supplemental wells in order to provide data necessary to monitor the groundwater performance standards and the compliance boundary monitoring for the remedy. Because groundwater flows to the east/northeast, the primary concern for groundwater migration is the residential area to the east of Pond Street. A second potential area of concern for groundwater migration is the residential area to the north of the Site. Additional monitoring wells will be installed to address this migration concern. The supplemental wells will be primarily screened in bedrock, in order to adequately monitor the bedrock groundwater flow zone. Details of groundwater monitoring will be resolved during design and the preparation of a long-term monitoring plan but monitoring is expected to include evaluation of all site-related contaminants such as VOCs, SVOCs and metals. Monitoring scope and frequency could change over time. Should monitoring data show an increasing trend of contamination at or approaching the compliance boundary, EPA will evaluate the need for additional remedial actions. Groundwater Performance Standards have been established and are discussed further in Section L.4.a.ii. below.

Periodic surface water and sediment monitoring will also be required to evaluate the performance of the monitored natural recovery remedy in the Unnamed Brook and other unexcavated areas that exceed sediment ecological risk levels. The selected remedy also includes long-term operation, inspections, and maintenance of any systems put in place as part of the remedy such as stormwater control structures or other measures conducted pursuant to the selected remedy. Long-term inspections and monitoring will also be required to ensure that institutional controls remain effective and are being enforced, and long-term monitoring of groundwater, surface water, sediments, and biota will be necessary to evaluate the effectiveness and re-colonization of biota in the dredged area, as well as the effectiveness of any re-vegetation and/or wetland restoration. The details of all Site related monitoring, inspection, and maintenance programs will be established during Remedial Design and Remedial Action.

Hazardous substances, pollutants or contaminants already remain at the Site due to previous actions (OU2 Shaffer Landfill closure and OU3 source control actions which are underway). Because of this, EPA has and will continue to review the Iron Horse Park Site at least once every five years to evaluate the protectiveness of the remedies. The Five-Year Reviews will evaluate the OU4 components of the remedies for as long as contaminated media above CERCLA risk levels remain in place. The purpose of this Five-year Review is to evaluate the implementation and performance of the remedies in order to determine if the remedies are or will be protective of human health and the environment. The Five-year Review will document recommendations and follow-up actions as necessary to ensure long-term protectiveness of the remedies or bring about protectiveness of a remedy that is not protective. These recommendations could include providing additional response actions, improving O&M activities, optimizing the remedy, enforcing access controls and institutional controls, and conducting additional studies and investigations. The most recent Five-Year Review was completed by EPA in September 2008. The next review will be required by September 2013.

Institutional Controls

In order to protect human health by controlling potential exposures to contaminated sediments and groundwater, the selected remedy relies on the use of Institutional Controls including limitations on land and groundwater uses and activities. Institutional Controls are also necessary for the protection of the selected remedy including limitations on uses and activities that interfere with or disturb components of the remedy. The details of the institutional controls will be resolved during the pre-design and remedial design phase in coordination with the parties performing the Remedial Action, impacted landowners, local officials, and MassDEP.

Risks from exposure to contaminated groundwater will be controlled through the implementation of institutional controls. Within the designated compliance zone where groundwater contamination exceeds the Performance Standards outlined in Table L-2, groundwater use restrictions will be required for drinking water, industrial process water, or other purposes. The institutional controls pertaining to groundwater may be implemented through measures that could include, but are not limited to, a local Town ordinance or other form of land use restriction that meets State property standards. Groundwater use restrictions will need to be placed on all properties lying inside of the groundwater compliance boundary shown in Figure L-2. In addition, a buffer zone will be established restricting the installation of any wells from the compliance boundary outward to either the Site boundary or 150 meters, whichever distance is less. Restrictions on land use within much of the Site have already been incorporated into prior remedy decisions. Restrictions called for under this selected remedy may be incorporated into Institutional Controls instruments being planned under those other Operable Units.

The selected remedy may change somewhat as a result of the remedial design and construction processes. Changes to the remedy described in this Record of Decision will be documented in a technical memorandum in the Administrative Record for the Site, an Explanation of Significant Differences ("ESD"), or a Record of Decision Amendment, as appropriate.

3. Summary of the Estimated Remedy Costs

Alternative SD-4: Source Control – Partial Excavation (B&M Pond) with Disposal

<u>CAPITAL COSTS</u>

<u>Site Preparation & Management</u>

Equipment Mobilization	$36,000
Planning & Support	$22,780
Contractor Field Supervision	$54,000
Vegetation Clearing	$ 6,900
Erosion Control	$11,200

Silt Curtain	$39,200
Temporary Access	$34,133
	$204,688
Sediment Excavation & Restoration	
Excavation & Transport to Staging Pad	$88,889
Treatment of Dewatering Fluids	$138,938
Lime for Sediment Stabilization	$83,333
Lime Blending	$33,333
Sediment Transport & Off-site Disposal	$733,333
Sample Characterization	$20,375
Wetlands Restoration	$298,439
	$1,885,529
SUBTOTAL	$2,090,217
Contingency (30%)	$627,059
Remedy Implementation Subtotal	$2,717,376
Project Management	$163,035
Remedial Design	$326,071
Construction Management	$217,381
	$706,487
TOTAL CAPITAL COST	**$3,423,863**

O&M – ANNUAL

Site Monitoring	
Sediment Sample Collection/Analysis	$39,500
Contingency (20%)	$ 7,900

SUBTOTAL	$47,400	
Technical Support (20%)	$ 9,480	
Project Management (5%)	$ 2,370	
TOTAL O&M ANNUAL COST	**$59,250**	

PERIODIC COSTS

Five Year Review (through Year 30)	$40,000	(20 years assumed to be needed)
TOTAL PERIODIC ANNUAL COST	**$ 2,000**	

PRESENT VALUE ANALYSIS

Cost Type	
Capital Cost	$3,423,863
O&M Cost (Present Value)	$627,458
Periodic Cost (Present Value)	$21,180
Total Present Value of SD-4	**$4,072,501**

Alternative GW-2: Groundwater Limited Action

CAPITAL COSTS

Monitoring Well Installation	$131,713
Institutional Controls	
Groundwater Use Restrictions	$9,000
SUBTOTAL	**$140,713**
Contingency (20%)	$28,143

SUBTOTAL (Remedy Implementation)	$168,856
Project Management	$13,508
Remedial Design	$25,328
Construction Management	$16,886
TOTAL CAPITAL COST	**$224,578**

O&M – ANNUAL

Site Monitoring	
Groundwater sample collection/analysis	$52,360
Contingency	$15,708
SUBTOTAL	$68,068
Technical Support	$10,210
Project Management	$3,403
TOTAL O&M ANNUAL COST	**$81,862**

PERIODIC COSTS

Five Year Review (through year 30)	$60,000
Monitoring Well Decommissioning	$43,700
	$103,700
TOTAL PERIODIC ANNUAL COST	**$3,457**

PRESENT VALUE ANALYSIS

Cost Type	
Capital Cost	$224,577

O&M Cost	$1,012,852
Periodic Cost	$42,863
Total Present Value of GW-2	**$1,280,292**

The information in this cost estimate summary table is based on the best available information regarding the anticipated scope of the remedial alternative. Changes in the cost elements are likely to occur as a result of new information and data collected during the engineering design of the remedial alternative. Major changes may be documented in the form of a memorandum in the Administrative Record file, an ESD, or a ROD amendment. This is an order-of-magnitude engineering cost estimate that is expected to be within +50 to -30 percent of the actual project cost, as permitted by EPA guidance.

The total estimated cost of the Selected Remedy is $5.4 million.

4. Expected Outcomes of the Selected Remedy

An expected outcome of the selected remedy is that **B&M Pond** sediments will no longer present an unacceptable ecological risk immediately upon excavation. Sediments in the **Unnamed Brook** and other areas not excavated that pose a risk will continue to pose an unacceptable ecological risk until the end of the MNR period. Another expected outcome of the selected remedy is that **groundwater** within the compliance zone will not be used for any purpose, and will be monitored to confirm that it is not migrating beyond the compliance boundary.

a. Remedial Standards

i. Sediment Cleanup Levels

Cleanup levels for chemicals of concern in sediments in Unnamed Brook and B&M Pond exhibiting an unacceptable ecological risk have been established such that they are protective of benthic invertebrates, which were the only group of aquatic organisms at risk from the Site's sediment contamination. Table L-1 summarizes these cleanup levels. Exposure parameters and assumptions utilized to develop these cleanup levels have been described in Section G.

Sediment cleanup levels were developed based on an evaluation of risk-based cleanup goals, background/reference concentrations, and other site-specific considerations (e.g., ARARs) in order to select the cleanup level. The approach used to develop the sediment cleanup levels involved using site-specific No Observed Effects Concentrations (NOECs) and Lowest Observed Effects Concentrations (LOECs) to establish a Maximum Acceptable Toxic Concentration (MATC) for each chemical of concern in sediment. The MATC is the geometric mean of the

NOEC and LOEC (FS, Appendix A-2; M&E, 2010). The MATC is therefore derived from site-specific data and adopted as the sediment Cleanup Level for each of the chemicals of concern corresponding to a low (acceptable) risk to aquatic wildlife receptors, in particular, benthic macroinvertebrates. PCB cleanup standards are based on an EPA Region 1 risk-based finding under the TSCA regulations at 40 C.F.R. 761.61(c). Under these standards, the EPA has selected PCB concentration of 1 mg/kg as a sediment cleanup goal to be used for risk management associated with B&M Pond and Unnamed Brook. This sediment Cleanup Level is consistent with sediment cleanup goals selected at other PCB sites in New England. Attached to this ROD is a finding by the Director of the Office of Site Remediation and Restoration, EPA, Region 1 that this PCB cleanup standard will not pose an unreasonable risk of injury to health or the environment (Appendix B).

The sediment cleanup levels are as follows:

Total PAHs	4,834	ug/kg
4,4'-DDD	16	ug/kg
Total PCBs	1	mg/kg
Chromium	22	mg/kg
Copper	63	mg/kg
Lead	115	mg/kg
Vanadium	23	mg/kg
Zinc	128	mg/kg

These sediment cleanup levels must be met at the completion of the remedial action within the Unnamed Brook and B&M Pond. These sediment cleanup levels attain EPA's risk management goal for remedial actions within a reasonable time frame while reducing the alteration of wetland resources and have been determined by EPA to be protective.

ii. Groundwater Performance Standards

Performance Standards have been established for groundwater for all chemicals of concern identified in the Baseline and Supplemental Risk Assessments found to pose an unacceptable risk to either public health or the environment. These standards have been set based on the ARARs (Maximum Contaminant Levels, MCLs), as available, or other suitable criteria described below. There is the potential for private well use in the area outside of the Site (though private wells do not appear to have been impacted by the Site groundwater contamination). In addition, the State has classified the groundwater outside the compliance zone as a low use and value groundwater, with small inclusions of medium use and value groundwater. Therefore, drinking water standards must be maintained beyond the Site's compliance boundary. In addition, due to the contaminated groundwater within the compliance zone, groundwater use restrictions to prevent the use of groundwater within the compliance zone will be necessary.

Groundwater Performance Standards are based on MCLs and MCL Goals (MCLGs) established under the Safe Drinking Water Act, more stringent State drinking water standards, and federal risk-based standards that are action-specific monitoring standards for protecting drinking water aquifers beyond the Site's compliance boundary. In the absence of a federal or more stringent State standard, or other suitable criteria to be considered (i.e., health advisory, State guideline), a performance standard was derived for each chemical of concern having carcinogenic potential (Classes A, B, and C compounds) based on a 10^{-6} excess cancer risk level per compound considering the future ingestion of and dermal contact with groundwater and inhalation of VOCs from domestic water usage. In the absence of the above standards and criteria, groundwater performance standards for all other chemicals of concern (Classes D and E) were established based on a level that represents an acceptable exposure level to which the human population including sensitive subgroups may be exposed without adverse effect during a lifetime or part of a lifetime, incorporating an adequate margin of safety (hazard quotient = 1) considering the future ingestion of and dermal contact with groundwater and inhalation of VOCs from domestic water usage.

If a value described by any of the above methods was not capable of being detected with good precision and accuracy or was below what was deemed to be the background value, then the practical quantification limit or background value was used as appropriate for the Groundwater Performance Standard.

Table L-2 summarizes the Performance Standards for carcinogenic and non-carcinogenic chemicals of concern identified in groundwater. Groundwater performance standards must be met at wells outside the groundwater compliance boundary shown in Figure L-2.

EPA has estimated that the Groundwater Performance Standards in Table L-2 are currently being met outside of the groundwater compliance boundary, while they will be exceeded within the groundwater compliance boundary in perpetuity, since OU3 waste is to be permanently disposed of on-site. Institutional controls will be utilized to ensure protectiveness within the compliance boundary by preventing the use of all groundwater. Institutional Controls will also be utilized to prevent installation of wells within the Buffer Zone that could draw out contaminated groundwater beyond the compliance boundary.

M. STATUTORY DETERMINATIONS

The remedial action selected for implementation at OU4 of the Iron Horse Park Site is consistent with CERCLA and, to the extent practicable, the NCP. The selected remedy is protective of human health and the environment, will comply with ARARs and is cost effective. In addition, the selected remedy utilizes permanent solutions and alternate treatment technologies or resource recovery technologies to the maximum extent practicable. The remedy does not satisfy the statutory preference for treatment that permanently and significantly reduces the mobility, toxicity, or volume of hazardous substances as a principal element (except to the extent that there may be some treatment of dewatering fluid or stabilization of sediment before disposal).

1. The Selected Remedy is Protective of Human Health and the Environment

The remedy at this Site will adequately protect human health and the environment by eliminating, reducing, or controlling exposures to human and environmental receptors through source removal, engineering controls, long-term monitoring, and institutional controls. More specifically, excavation and Monitored Natural Recovery of contaminated sediment, monitoring of groundwater, and land use and groundwater restrictions will control and eliminate potential risks posed by contaminated groundwater and sediment within Operable Unit 4 of Iron Horse Park. Excavation and MNR of sediments will prevent direct contact with contaminated material by ecological receptors (immediately in excavated areas and over time through MNR). Land use restrictions will ensure that remedial measures are preserved and continue to prevent exposure and further releases. Groundwater use restrictions will prevent exposure to and use of contaminated groundwater, prevent contaminated groundwater being drawn out from the compliance zone by preventing well installation in the buffer zone, and will be protective of human health. Compliance monitoring will ensure restrictions remain in effect and are enforced. Long-term monitoring of groundwater will confirm that contaminated groundwater is not migrating beyond the compliance boundary for the Site.

The selected remedy will prevent exposure to potential human health risk levels from contaminated groundwater. The selected remedy will control ecological risk by eliminating direct contact with and ingestion of contaminants by aquatic receptor species above acceptable ecological risk levels in sediment in the B &M Pond immediately upon excavation and elsewhere where sediment risk levels are exceeded at the end of the MNR period. Implementation of the selected remedy will not pose any unacceptable short-term risks or cause any cross-media impacts.

The selected response action addresses low-level threat wastes at the Site by: eliminating exposure to ecological receptors from contaminated sediment. This is accomplished through source control actions at the affected wetlands. In addition, the source control actions will help eliminate the migration of contaminated sediment. Long term monitoring/maintenance and institutional controls for groundwater and for sediments being addressed through MNR will ensure that the remedy remains protective in the future. There are no principal threat wastes at OU4.

2. The Selected Remedy Complies With ARARs

The selected remedy, consisting of excavation and Monitored Natural Recovery of contaminated sediment, monitoring of groundwater, and land and groundwater use restrictions, will comply with all federal and any more stringent state ARARs that pertain to the Site (see Table L-3a-f).

The partial excavation/MNR sediment component of the remedy is the Least Environmental Damaging Practicable Alternative under the federal Clean Water Act for protecting wetland resources at the Site. This determination was made since the remedy creates the best balance between the need to destroy wetland resources to remove the most contaminated sediments on Site and the preservation of less contaminated wetlands, with cleanup standards achieved through MNR.

This ROD also includes a finding under the TSCA regulations at 40 C.F.R. 761.61(c) that the PCB sediment cleanup level of 1 mg/kg will not pose an unreasonable risk of injury to health or the environment and that the dredging, passive dewatering, and management of PCB contaminated sediments prior to disposal can be conducted in a manner that does not pose an unreasonable risk of injury to health or the environment.

3. The Selected Remedy is Cost-Effective

The selected remedy is cost-effective because the remedy's costs are proportional to its overall effectiveness (see 40 CFR 300.430(f)(1)(ii)(D)). This determination was made by evaluating the overall effectiveness of those alternatives that satisfied the threshold criteria (i.e., that are protective of human health and the environment and comply with all federal and any more stringent ARARs, or as appropriate, waive ARARs). Overall effectiveness was evaluated by assessing three of the five balancing criteria -- long-term effectiveness and permanence; reduction in toxicity, mobility, and volume through treatment; and short-term effectiveness, in combination. The overall effectiveness of each alternative then was compared to the alternative's costs to determine cost-effectiveness. The relationship of the overall effectiveness of this remedial alternative was determined to be proportional to its costs and hence represents a reasonable value for the money to be spent.

Table J-9 helps demonstrate the cost-effectiveness of the selected remedy. It should be noted that for sediments, Alternative SD-4 (Partial-Excavation) and SD-6 (Full-Excavation appear to compare fairly closely with regard to cost although SD-4 is less expensive. However, the access difficulties of SD-6, and the resulting significant additional wetland restoration required, make SD-6 less implementable. In addition, the moderate level of ecological risk, as determined in the baseline risk assessment, does not justify the significant wetland disruption which would be involved in the implementation of SD-6, particularly where lines of evidence exist supporting the effectiveness of MNR in achieving cleanup levels.

4. The Selected Remedy Utilizes Permanent Solutions and Alternative Treatment or Resource Recovery Technologies to the Maximum Extent Practicable

Once the Agency identified those alternatives that attain or, as appropriate, waive ARARs and that are protective of human health and the environment, EPA identified which alternative utilizes permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable. This determination was made by deciding which of the identified alternatives provide the best balance of trade-offs among alternatives in terms of: 1) long-term effectiveness and permanence; 2) reduction of toxicity, mobility or volume through treatment; 3) short-term effectiveness; 4) implementability; and 5) cost. The balancing test emphasized long-term effectiveness and permanence and the reduction of toxicity, mobility and volume through treatment; and considered the preference for treatment as a principal element, the bias against off-site land disposal of untreated waste, and community and state acceptance. The selected remedy provides the best balance of trade-offs among the alternatives.

Table J-9 demonstrates how the respective selected remedies, provide the best balance of trade-offs when compared against the evaluation criteria. As discussed previously, the difference between the different protective sediment alternatives and the relative benefits achieved are not great enough to justify the significant wetland disruption that would accompany the implementation of Alternative SD-6.

5. The Selected Remedy Does Not Satisfy the Preference for Treatment Which Permanently and Significantly Reduces the Toxicity, Mobility or Volume of the Hazardous Substances as a Principal Element

The principal element of the selected remedy for sediment is source control by either excavation or Monitored Natural Recovery (MNR). This element addresses the primary ecological threat at the Site, contaminated sediment. To the extent there may be some treatment of dewatering fluid or stabilization of sediment before disposal there may be limited satisfaction of the preference for treatment. No treatment alternatives were considered for groundwater because contaminated groundwater occurs solely within the compliance boundary for the waste management areas at the Site. The remedy does not satisfy the statutory preference for treatment as a principal element. Treatment alternatives evaluated in the Feasibility Study were not practicable, because under the OU3 remedy contaminated media are to be permanently disposed of on-site and the State has designated most of the compliance zone area as a non-potable aquifer, precluding the use of any groundwater within the compliance zone. Even if treatment alternatives were pursued, they would not be practicable due to low effectiveness, low cost-effectiveness or low implementabiliy.

6. Five-Year Reviews of the Selected Remedy are Required.

Because this remedy will result in hazardous substances remaining on-site above levels that allow for unlimited use and unrestricted exposure, a review will be conducted within five years after initiation of the remedial action to ensure that the remedy continues to provide adequate protection of human health and the environment. Five-year reviews for the sediment component of the remedy will continue until sediment cleanup levels are achieved at the end of the MNR period (five-year reviews would remain in perpetuity if the MNR process results in contaminated sediments exceeding risk levels becoming naturally covered by clean sediment). In addition, five-year reviews are already required for the entire Iron Horse Park Superfund Site due to the prior initiation of remedial action at the B&M Wastewater Lagoon (OU1). The next Five-Year Review for Iron Horse Park is due in September 2013.

N. DOCUMENTATION OF SIGNIFICANT CHANGES

There are no significant changes from the alternatives presented in the October 2010 Proposed Plan, except for the change in location for the compliance zone boundary and the creation of the buffer zone either 150 meters from the compliance boundary or at the Site property line, whichever distance is less.

O. STATE ROLE

The Massachusetts Department of Environmental Protection has reviewed the Remedial Investigation, Risk Assessment and Feasibility Study to determine if the selected remedy is in compliance with applicable or relevant and appropriate State environmental and facility siting laws and regulations. The MassDEP has reviewed the various alternatives and has given its support for the remedy for OU4 of the Iron Horse Park Site as called for in this ROD (see Appendix A).

THE RESPONSIVENESS SUMMARY

EPA published notices of availability of the draft Proposed Plan and Administrative Record in the Lowell Sun on October 14, 2010 and the Billerica Minuteman on October 21, 2010 and released the final Proposed Plan to the public on October 26, 2010. EPA also held a public information session on October 27, 2010 at the Billerica Town Hall. A Public Hearing was held on November 9, 2010, also at the Billerica Town Hall. A transcript was created for the November 9, 2010 hearing and has been made part of the Administrative Record for this Record of Decision. Based upon numerous requests from the public, the Public Comment Period was extended until January 14, 2011. In addition to the oral comments, a number of written comments were provided on the Proposed Plan. Outlined below is a summary of comments received from the public and other interested parties during the public comment period and EPA's response to those comments. Similar comments have been summarized and grouped together. The full text of all written and oral comments received during the comment period has been included in the Administrative Record.

Citizen Comments

C1: Commenter supports choosing Alternative SD-6, with an additional 10 years of groundwater monitoring. Concerned that if SD-6 is not implemented, contaminant migration will lead to unintended risks to human health and the environment. Concerned with potential impacts to the Concord River (if SD-6 is not implemented).

***EPA Response**: As discussed in the Baseline Risk Assessment, no unacceptable human health risk was identified from exposure to contaminated sediment at the Site. The only risk to human health identified in the Baseline Risk Assessment, was from use of groundwater on-site (inside of the Compliance Boundary). The risk is a hypothetical, future risk because Site groundwater is not used for drinking water. Alternatives SD-4 and SD-6 address ecological risk in sediment within the Iron Horse Park Site. The selected remedy (SD-4) includes long-term groundwater monitoring to ensure that groundwater in excess of performance standards does not migrate beyond the compliance boundary. Groundwater monitoring will continue in perpetuity since waste will be permanently contained in place on Site under OU3. An additional restricted buffer zone to prevent the installation of groundwater extraction wells that might draw contaminated groundwater out from the compliance zone will be established beyond the compliance boundary.*

Surface water from Iron Horse Park is within the Shawsheen River watershed, so impacts to the Concord River are very unlikely. In addition, ecological risk associated with sediment at Iron Horse Park has not migrated beyond the B&M Pond.

<u>C2:</u> Notes the perception that cancer incidence in Billerica is at higher than expected levels. Comment further notes that numerous known or anticipated carcinogens are found at the Site, and questions the appropriateness of an additional 20 years for SD-4 to achieve cleanup levels.

***EPA Response**: Sediment and groundwater are the contaminated media associated with Iron Horse Park OU4. Site related contamination in these media appears to be confined to the Site at this time (for groundwater, within the Compliance Zone). Because of this, it is unlikely that there is a link between Site groundwater and health impacts off-Site. The intent of the groundwater monitoring program and restrictions on groundwater well installations is to ensure that contaminants do not migrate outside of the Compliance Zone. Contaminants in sediment are at concentration levels lower than levels which are a human health risk concern.*

As noted earlier, the risks associated with Site sediments (which SD-4 addresses) are ecological risks, not human health risks. The ecological risks identified in sediments are characterized as "moderate". While there are ecological risks which must be addressed, overall, the affected wetlands appear in general, to be functioning fairly normally and without further spread of contaminants downstream of the B&M Pond. Contaminants in sediment are not migrating downstream, and in the Unnamed Brook there is data to support the determination that the Monitored Natural Recovery (MNR) component of the remedy will achieve sediment cleanup levels. Choosing Alternative SD-4 is an appropriate balance that prevents the alteration of an existing wetland system that is acting as a filter and sink to prevent the migration of contamination while achieving cleanup levels in a reasonable period of time.

<u>C3:</u> Urges off-site disposal of excavated PCB contaminated sediment.

***EPA Response**: The decision as to whether excavated sediment will be disposed of on-site within one of the OU3 waste management areas or disposed of off-site will not be made until the remedial design phase, after issuance of this Record of Decision. At this time it is not known whether the timing of OU3 remediation will permit any OU4 waste to be disposed of on site. PCBs at levels almost twice as high as those found in the sediments to be dredged under OU4 are going to be safely disposed of in the B&M Landfill (the most likely on-Site location for disposal of contaminated sediment) as part of the OU3 remedy. The B&M Landfill is being capped under hazardous waste standards that are also protective for the disposal of PCBs. If any other OU3 landfill is selected for the disposal of OU4 sediments an assessment would be conducted to insure that the disposal of OU4 sediment would be a protective part of the OU3 remedy.*

<u>C4:</u> Questions the effectiveness of SD-4 on PCBs due to the slow rate of degradation.

***EPA Response**: As part of SD-4 all PCB contaminated sediments exceeding ecological risk levels will be removed (currently in the Unnamed Brook where MNR will be used, PCB contamination does not exceed sediment cleanup levels).*

<u>C5:</u> Favors Alternative SD-6 over Alternative SD-4, because SD-6 provides certainty (by removing contaminants) and a short time frame. Concern is expressed that the longer time to achieve cleanup levels in SD-4 would have adverse impacts on human health risk.

***EPA Response**: Contaminants in sediments at Iron Horse Park OU4 were not found at concentrations that were a concern for human health. Neither Alternative SD-4 nor Alternative SD-6 has an impact on potential human health risk as both were designed to address ecological risks in sediments. There is only an ecological risk from exposure to contaminated sediments and SD-4 provides a better balance between limiting disturbance to functioning wetlands that are naturally reducing contaminant exposure to the environment and removing relatively low levels of contamination from the Site without significantly altering the wetlands and waterways. The monitoring component of Alternative SD-4 ensures that if testing shows that natural processes are not effective then more active remedial measures can be taken through a future Superfund decision document to remove any remaining ecological risks.*

<u>C6:</u> Expresses concern that if the OU3 remedy has not been fully implemented, it will delay the implementation of the OU4 remedy.

***EPA Response**: There is no construction or staging issue that would prevent implementation of the OU4 remedy in the event that the OU3 remedy has not been fully implemented. If the OU3 waste management areas have not been closed before the OU4 dredging is begun, there is potential to dispose of the OU4 sediment on-site. If no on-site disposal areas are available, the OU4 remedy will continue with the sediment being disposed of off-Site.*

<u>C7:</u> Asserts that low surface water and groundwater levels will lead to the spread of contamination to neighborhoods and other waterways when water levels rise again.

***EPA Response**: Groundwater contaminants have been discharging to local surface waters and wetlands for years, both during high and low water level periods, but off-Site impacts have not been detected. The remedy for groundwater includes monitoring to ensure that contaminants are not migrating beyond the on-Site compliance boundary established by the remedy and restrictions on the installation of groundwater wells that could draw contaminants from the compliance zone. Contaminants detected in surface water have not been at high enough concentrations to be considered a problem. Conservative risk calculations have also been performed to confirm this. Even if a flood scenario (or just much higher water levels than recently observed) occurred, there would not be a concern regarding transport to surrounding areas based on the concentrations of contaminants present within the Site. In addition, flooding* *scenarios would be accompanied by high water volumes which would dilute concentrations even further. Finally, with respect to contaminated sediment migration, the existing layout of the streams and wetlands at the site are not conducive to scouring which might occur in other streams during high water/flooding scenarios. Therefore, EPA does not believe that off-Site transport of contaminated sediment would occur.*

C8: Suggests that Iron Horse Park documents illustrate that there is confusion regarding surface water flow in and around the Site, and that the "surface water divide" is not accurately defined.

***EPA Response**: As documented in the Remedial Investigation for OU3 (Section 3.3.1.1) the surface water divide between the Concord River basin and the Shawsheen River basin, coincides roughly with High Street. To the west of this point, surface water in the Middlesex Canal flows to the Concord River, and to the east of this point, surface water flows to the Shawsheen River.*

C9: Raises concerns regarding the potential for exposure/risk from residential vapor intrusion. Commenter believes that Site characterization is incomplete without vapor intrusion testing in homes surrounding the Site.

***EPA Response**: As part of OU4 a supplemental human health risk assessment was performed to evaluate the current and potential future human health risks and hazards associated with direct and indirect exposure to groundwater, including vapor intrusion, potentially impacted by the Site, based on groundwater data collected in the winter of 2005/2006.*

Vapor intrusion was not found to be a potential exposure pathway. The only exposure pathway found to present a risk at the Site was for a potential future on-site resident (adult and young child) with exposure (by ingestion, dermal contact, and inhalation) to untreated site-wide overburden and bedrock groundwater.

The purpose of the groundwater monitoring and well installation restriction portions of the remedy is to ensure that contaminated groundwater from the Site does not migrate beyond the Compliance Zone. No risks associated with exposure to groundwater, including from vapor intrusion, have been identified outside of the Compliance Zone.

C10: Notes that PCBs and metals will not "break down" using MNR and so, will remain an exposure and risk concern. Removing the contaminants (SD-6) would remove the potential for adverse health effects.

***EPA Response**: The risk assessment did not identify any potential human health risks due to exposure to Site sediments. The identified risks associated with exposure to Site sediments are ecological risks only.*

Regarding metals, in the Unnamed Brook, the remedy utilizes MNR to achieve sediment cleanup levels. As described in the Proposed Plan and the Feasibility Study, MNR uses natural processes to contain the spread of contamination and reduce the concentration and amount of pollutants at contaminated sites. Monitored Natural Recovery includes natural physical, biological, and chemical processes. Sedimentation is an example of a physical process where new layers of sediment cover the contaminated sediment layers, thereby protecting organisms from being exposed to contaminants. Chemical processes may convert metals and other pollutants to a form that is less accessible to ecological receptors. Additionally, pollutants can stick or sorb to soil, which holds them in place. This chemical process does not clean up the pollutants, but it can keep them from leaving the site. Processes sorbtion combined with sedimentation prevent organisms from being exposed to contaminants without necessarily degrading the contaminants.

As part of SD-4 all PCB contaminated sediments exceeding ecological risk levels will be removed (currently in the Unnamed Brook where MNR will be conducted, PCB contamination does not exceed sediment cleanup levels).

C11: Cites the exceedance of MCLs (drinking water standards), in on-site monitoring wells, as a reason to choose SD-6 over SD-4.

***EPA Response**: Alternatives SD-6 and SD-4 address contaminated sediments at Iron Horse Park. Neither alternative is expected to or intended to impact groundwater at the Site. Under the groundwater component of the remedy, groundwater within the compliance boundary for the Site does not need to meet drinking water standards since waste is being permanently managed in place at the surface under OU3 and the remedy includes restrictions to prevent the use of groundwater within the compliance zone and an adjacent buffer zone.*

C12: Notes that business practices at Iron Horse Park demonstrate that Institutional Controls have not been put in place.

***EPA Response**: The comment correctly notes that Institutional Controls have yet to be put in place at Iron Horse Park. Institutional controls are a component of the OU4 remedy created by this Record of Decision. Therefore institutional controls for the OU4 remedy will be established post-ROD. There is no specific timing for when Institutional Controls are required to be established. In the case of the OU4 remedy, groundwater is currently not being used as a drinking water source within the Site and there is no residential development within the Site, so there is no current exposure risk from activities that will be permanently restricted through the remedy's Institutional Controls.*

C13: Feels that use of the term "acceptable levels" in relation to concentrations of contaminants, and specifically, carcinogens, found at the Site, is not satisfactory.

***EPA Response**: In a risk assessment cancer risks are based on potential human exposures and chemical toxicity. The OU4 risk assessment assumes that individuals who might be exposed to surface water or sediments at the Site are workers and trespassers (older children). The risk assessment also assumes that individuals who might be exposed if on-site groundwater were for residential use include children and adults (a potential future use scenario). EPA relied on risks associated with reasonable maximum exposure (RME) in its Proposed Plan. RME is the maximum exposure reasonably expected to occur. The RME includes conservative estimates of the potential frequency and duration of exposure, the amount of contamination that could be ingested, inhaled or absorbed through the skin, and the contaminant.*

Cancer toxicity is expressed as a cancer slope factor (CSF). CSFs are estimates of the upper bound probability of an individual developing cancer over a lifetime as a result of exposure to a site-related chemical. This means that the EPA is reasonably confident that the actual cancer risk will not exceed the estimated risk, which is calculated using the CSF. Cancer risks are expressed as the probability of developing cancer, for example, 1 in a million risk (1 in 1,000,000). With respect to Superfund sites, an acceptable cancer risk range of 1 in 10,000 to 1 in 1,000,000 is used. Cancer risks are calculated individually for each chemical and then summed to give a total cancer risk for each exposure pathway.

There are uncertainties associated with risk assessment. However, the use of high-end exposure assumptions and the estimates of the upper bound probability of an individual developing cancer over a lifetime as a result of exposure to a site-related chemical tend to overestimate risks.

C14: Expresses concern that known and potential carcinogens have been detected at the Site, and that while individually, they may be present at what EPA considers "acceptable levels", cumulatively (when evaluated together as a group) they may cause adverse health impacts.

***EPA Response**: As discussed in the response above, cancer risks are calculated individually for each chemical and then summed to give a total cancer risk for each exposure pathway thereby taking into account any cumulative impact.*

C15: Notes an elevated incidence of cancer in Billerica (according to "Cancer Incidence in Massachusetts - City/Town Supplement 2003-2007"), as well as the presence of carcinogens at the Site, and notes there appears to be a link between the two.

***EPA Response**: Sediment and groundwater are the contaminated media associated with Iron Horse Park OU4. The only current risk identified is from exposure to contaminants in sediment. This is an ecological risk, not a human health risk. Human health risk from consumption of groundwater is a hypothetical future risk since no one is currently using Site groundwater as drinking water. Testing conducted to date shows that Site related contamination in sediment and groundwater is confined to the Site (for groundwater, within the Compliance Zone). Because of* *this, it is very unlikely that there is a link between Site groundwater and health impacts off-Site. The intent of the groundwater monitoring program and well installation restrictions is to ensure that contaminants do not migrate outside of the Compliance Zone. Contaminants in sediment are at concentration levels lower than levels which are a human health risk concern. Contaminated sediment at these lower levels, that only pose an ecological risk, are also restricted to occurring on Site.*

C16: Approximately 125 comments were received indicating a preference for Alternative SD-6, noting benefits to "our health and family, and the environment". The comments also requested that groundwater testing be performed for at least 10 years following completion of the SD-6 remedy. A petition with 102 signatures was submitted which made the same comments.

***EPA Response**: Alternatives SD-4 and SD-6 address ecological risk in sediment within the Iron Horse Park Site. As discussed in the Baseline Risk Assessment, no unacceptable risk was identified from exposure of humans to contaminated sediment at the Site. The only risk to human health identified in the Baseline Risk Assessment, was from use of groundwater on-site (inside of the Compliance Boundary). Human health risk from consumption of groundwater is a hypothetical future risk since no one is currently using Site groundwater as drinking water. Choosing Alternative SD-4 provides a better balance between limiting disturbance to functioning wetlands that are naturally reducing contaminant exposure to the environment and removing relatively low levels of contamination from the Site while significantly altering the wetlands and waterways. The monitoring component of Alternative SD-4 ensures that if testing shows that natural processes are not effective then more active remedial measures can be taken to remove any remaining ecological risks.*

The remedy includes long-term groundwater monitoring and well installation restrictions to ensure that groundwater in excess of drinking water standards does not migrate beyond the Compliance Boundary. Groundwater monitoring will continue in perpetuity because, as part of the OU3 remedy waste will be permanently contained on site.

C17: Indicated that contaminated soil should be disposed of off-site to eliminate the potential for leaching contaminants to groundwater.

***EPA Response**: Contaminated soils at the Site are addressed under OU3. To the extent the comment may also pertain to Site sediments - the maximum concentrations of individual contaminants in sediment is lower than the level of those same contaminants that have been detected in the B&M Landfill and will be safely capped on-site as part of the OU3 remedy. Depending on the timing of the OU3 landfill closure work and OU4 remedial design at the time the sediment dredging takes place, excavated sediment may be disposed of into an on-site landfill or disposed of off-site. Either option is protective of human health and the environment.*

C18: Commented that human health should be the top priority and that Alternative SD-6 should be chosen as it is more thorough and will prevent spikes in health problems.

EPA Response: *Alternatives SD-4 and SD-6 were both designed to address only ecological risk in sediment within the Iron Horse Park Site. As discussed in the Baseline Risk Assessment, due to the relatively low level of contaminants present in the sediment, no unacceptable risk was identified from exposure of humans to the Site's contaminated sediment. Therefore, Alternatives SD-4 and SD-6 are both equally protective of human health.*

C19: Comment urges choosing Alternative SD-6, suggesting that the $ 1 million cost difference between SD-6 and SD-4 does not justify choosing Alternative SD-4 which has an estimated 14-15 year longer cleanup time when compared with SD-6.

EPA Response: *Alternatives SD-4 and SD-6 address ecological risk in sediment within the Iron Horse Park Site. As discussed in the Baseline Risk Assessment, no unacceptable risk was identified from exposure of humans to contaminated sediment at the Site. The only risk to human health identified in the Baseline Risk Assessment, was from use of groundwater on-site (inside of the Compliance Boundary). Alternative SD-4 provides a better option for removing contaminants in Site sediments in the B&M Pond and allowing existing wetland systems in the Unnamed Brook to remain in place and permit ongoing natural processes to address the remaining contamination where there is data showing that natural recovery is occurring. Since cost is one of the Superfund criterion that EPA must evaluate in its balancing of factors to consider, the lower cost of Alternative SD-4 was also considered in the selection process.*

Comments Made By Elected Officials

E1: A State Representative commented indicating a preference for Alternative SD-6, and noting benefits to health and family, and the environment. The comments also requested that groundwater testing be performed for at least 10 years following completion of the SD-6 remedy.

EPA Response: *See response to comment "C16" above.*

E2: From a member of the Billerica Board of Selectmen. Alternative SD-6 should be chosen in order to make residents and future businesses comfortable and safe. SD-6 works best with expediting the cleanup.

EPA Response: *Alternatives SD-4 and SD-6 were designed to address only ecological risk in sediment within the Iron Horse Park Site. As discussed in the Baseline Risk Assessment, no unacceptable risk was identified from exposure of humans to contaminated sediment at the Site. Therefore, EPA has found that on balance that Alternative SD-4 provides a better option for removing contaminants in Site sediments in the B&M Pond and allowing existing wetland* *systems in the Unnamed Brook to remain in place and permit natural processes to address the remaining contamination where there is data showing that natural recovery is occurring*

Comments Received at 11/9/10 Public Hearing

O 1: Commenter 1 expressed the concern that alternative SD-4 was not as preferable as alternative SD-6 because of the uncertainty regarding whether residual contamination would still be present. The residents have been waiting over 26 years and are now being asked to wait another 20 or so years.

***EPA Response**: The risks associated with Site sediments (which SD-4 addresses) are ecological risks, not human health risks. The ecological risks identified in sediments are characterized as "moderate". While there are ecological risks which must be addressed, overall, the affected wetlands appear in general, to be functioning fairly normally, without major adverse impacts and without further spread of contaminants downstream of B&M Pond. Contaminants in sediment are not migrating downstream. Alternative SD-4 provides a better option for removing the highest levels of contaminants in Site sediments and allowing existing wetland systems to remain in place and permit natural processes already underway, to address the remaining contamination where there is evidence that natural recovery is already occurring.*

O2: Comment O2 notes that the 15 year difference between alternatives SD-4 and SD-6 would allow enough time to replant any vegetation impacted by alternative SD-6 and that the $1 million difference in cost was small compared to EPA's overall budget for Superfund cleanups. It is requested that EPA give significant consideration to alternative SD-6.

***EPA Response**: See previous response. While it is true that vegetation could be replanted during the time period, as contaminants are already being addressed through natural processes within the existing wetland, excavation seems on balance to be unnecessary. Under the Superfund remedy selection regulations, cost is one of the criterion to be considered in comparing alternatives in relationship to each other, not in relationship to any national funding levels or sources of funding from responsible parties.*

O3: Requests that the sediment excavated from B&M Pond be transported and disposed of off-site. In the alternative, Commenter requests that any capping of the contaminated sediment on-site include a clay base to avoid any contamination going back into the ground. Comment also pointed out an inconsistency between Table 3-2 and Table 4-6 in the Feasibility Study for Operable Unit 4.

***EPA Response**: A decision between on-site and off-site disposal will not be made until the remedial design stage, post-ROD. There are a number of factors that will be considered including the progress of the OU3 remedial actions and timing issues with the OU4 sediment excavation. The OU3 remedy, through a public process, has already made a determination that* *there are landfills on-site where contaminants at the levels found in the sediment can safely be disposed of. Therefore, on-site disposal does not raise any additional environmental issues within Iron Horse Park, while eliminating both trucking impacts on the surrounding neighborhood as well as transportation and disposal costs. As the sediment that may be disposed of in the landfills is less contaminated overall than the landfills themselves, adding a bottom liner/layer is not necessary.*

The comment notes that there is an inconsistency between Table 3-2 and Table 4-6. With regard to Alternative SD-6, the 5-Year Review is not mentioned in Table 3-2 and it is included as a cost consideration in Table 4-6. The 5-Year Review was inadvertently omitted from Table 3-2.

O4: Notes that there is currently no fence around B&M Pond and that the Site should be fenced to protect children from entering the Site.

***EPA Response**: The risks associated with Site sediments (which SD-4 addresses) are ecological risks, not human health risks. Any physical safety issues associated with access to the pond are the responsibility of the landowner (except during periods when active remediation is being carried out).*

O5: Notes that there are abutters of the Site that live very close to the site that have well water and asked how EPA plans to address these residential well owners.

***EPA Response**: At this time, there is nothing to indicate that wells outside of the Compliance Zone have been impacted (or are currently at risk of being impacted) by Site groundwater. However, this issue is one of the purposes of the groundwater monitoring component of the remedy – to ensure that off-site impacts, including impacts to private wells, do not occur. The compliance boundary and its associated buffer zone have been established to create a sufficient zone that can be monitored between areas with current groundwater exceedances and the abutting properties. The monitoring well network will be established to test groundwater before it reaches any abutting property and the well prohibition buffer zone will prevent wells from being installed immediately adjacent to the compliance zone that could draw out groundwater contamination. There also is the alternative under the remedy to sample abutting wells, if necessary, if groundwater is determined to be migrating from the Site. At a minimum, the 5-Year Review will make an assessment of whether groundwater contaminant migration has occurred, as well as whether additional investigations or actions are warranted.*

O6: Asks how monitored natural recovery can address metals in sediment.

***EPA Response**: Monitored Natural Recovery includes natural physical, biological, and chemical processes. Sedimentation is an example of a physical process where new layers of sediment cover the contaminated sediment layers, thereby protecting organisms from being exposed to contaminants. Chemical processes may convert metals to forms that aren't as toxic* *to ecological receptors. Additionally, pollutants can stick or sorb to soil, which holds them in place. This physical process does not clean up the pollutants, but it can keep them from leaving the site. Processes like sorbtion combined with sedimentation which prevent organisms from being exposed to contaminants without necessarily degrading the contaminants, would be processes that address metals contamination.*

<u>O7</u>: Asks that EPA explain the dependency of OU4 on OU3; i.e., whether OU3 needs to be further along before work can begin on OU4 at the Site.

***EPA Response**: There is no construction or staging issue that would prevent implementation of the OU4 remedy in the event that the OU3 remedy has not been fully implemented. If the OU3 remedy has not been fully implemented, EPA will evaluate during the remedial design stage whether contaminated sediment excavated from B&M Pond can be disposed of in one of the OU3 landfills slated for capping, or shipped off-site.*

<u>O8</u>: Comment favors Alternative SD-6 and off-site disposal of contaminated sediment. Comment also asks that the EPA consider the impact of truck traffic on the neighborhood during the cleanup.

***EPA Response**: There are already numerous landfills at Iron Horse Park. If, during the remedial design stage it is determined that one of them is able to be utilized to dispose of sediment (which has relatively low levels of contamination when compared to the landfill material), then on-site disposal will likely be found to be the best option. On-site disposal does not raise any additional environmental issues within Iron Horse Park since the OU3 ROD already has determined that the on-site containment remedy is protective, while it would eliminate both trucking impacts on the surrounding neighborhood as well as transportation and disposal costs.*

Potential impacts of truck traffic discussed in the Proposed Plan indicated that vehicles accessing the site would use the existing Iron Horse Park entrance and that EPA would work with Town officials to determine the best routes to and from the site to minimize any traffic concerns. If excavated material is transported off-site instead of being capped on-site, it would take about a month and 200 to 350 truck loads to transport the approximately 7,400 cubic yards of material.

<u>O9</u>: Expressed concern that metals and PCBs do not oxidize or break down and requested that EPA select Alternative SD-6 instead of SD-4 given that the additional costs of wetlands restoration do not outweigh the risks to health and the environment.

***EPA Response**: See EPA response to comment "C4".*

<u>O10</u>: Requests an additional extension to the public comment period.

***EPA Response**: Due to this and other requests, the public comment period was extended to January 14, 2011.*

O11: Expressed a preference for Alternative SD-6 because of the concern that if the sediment in Unnamed Brook is not excavated there may be a problem created along the road.

***EPA Response**: It is assumed that the commenter meant "down the road," i.e. in the future, rather than "along the road" since there are no roadways associated with the sediment remediation areas. Contaminants in sediments at Iron Horse Park OU4 were not found at concentrations that were a concern for human health. Alternatives SD-4 and SD-6 do not have an impact on potential human health risk. There is an ecological risk from exposure to contaminated sediments. Although the Monitored Natural Recovery remedy for the Unnamed Brook will take an extended period of time to achieve cleanup levels, ecologically available contaminant levels will be reduced throughout the period as sedimentation and other natural processes occur within the waterways. If monitoring shows that MNR is not successfully reducing contaminant levels, additional remedial measures can be evaluated in a future OU4 Superfund decision document.*

O12: Commenter noted that EPA's preferred option (for cleaning up sediment) cost just $1 million and would take over 20 years to complete and the residents of Billerica have waited long enough. Commenter also asked what the plan was for reducing levels of PCBs in sediment since the proposed plan does not eliminate PCB levels. Commenter also stated that the effort to avoid disturbing wetlands at the Site by selecting natural restoration was trumped by residents' health and need for clean drinking water.

***EPA Response**: It is acknowledged that Iron Horse Park has taken a long time. However, EPA believes that Monitored Natural Recovery (even with the longer projected cleanup time) provides the best balance of the issues regarding cleanup of the Unnamed Brook portion of the Site. First, there is no human health risk associated with Unnamed Brook sediment. Second, the ecological risk is described as moderate in the conclusion section of the Ecological Risk Assessment. Third, there is little evidence of downstream contaminant migration. Fourth, data demonstrating decreasing levels of sediment contamination, supports choosing Monitored Natural Recovery. The above do not support the wetland disruption or expense associated with sediment excavation at the Unnamed Brook. (EPA believes that the comment intended to state that EPA's preferred option for cleaning up sediment (Alternative SD-4) costs $1 million less than Alternative SD-6, which the Commenter prefers).*

As part of SD-4 all PCB contaminated sediments exceeding ecological risk levels will be removed; currently in the Unnamed Brook where MNR will be conducted, PCB contamination does not exceed sediment cleanup levels.

For the most part, groundwater discharges to surface water at Iron Horse Park. EPA does not believe that contaminated sediments in the Unnamed Brook (or any contaminated sediments at the Site) are contributing to groundwater contamination at Iron Horse Park.

O13: Commenter expressed a preference for alternative SD-6 for all of the reasons already stated by others and because of the impacts of contamination on pond life, migratory birds and other wildlife which may have impacts beyond Billerica.

***EPA Response**: The Ecological Risk Assessment evaluated, among other things, the potential risk to migratory birds from exposure to sediments at the B&M Pond and the Unnamed Brook. In summary, there was a risk identified to benthic invertebrate life but not to aquatic invertebrates and warm water fish exposed to surface water, or to predatory (piscivorous) birds on-site. Impaired benthic invertebrate communities are limited to the on-site waterways.*

O14: Commenter requested testing of homes near the Site for vapor intrusion to reassure residents that harmful chemicals are not seeping into their basements and being inhaled.

***EPA Response**: Part of the OU4 evaluation included a supplemental human health risk assessment, which was performed to evaluate the current and potential future human health risks and hazards associated with direct and indirect exposure to groundwater potentially impacted by the Site, including vapor intrusion, based on groundwater data collected in the winter of 2005/2006.*

Vapor intrusion was not found to be an exposure pathway. The only exposure pathway found to present a risk at the Site was for a potential future on-site resident (adult and young child) with exposure (by ingestion, dermal contact, and inhalation) to untreated site-wide overburden and bedrock groundwater.

The purpose of the groundwater monitoring portion of the remedy is to ensure that contaminated groundwater from the Site does not migrate beyond the Compliance Zone. No risks associated with exposure to groundwater, have been identified outside of the Compliance Zone. A sufficient monitoring zone has been incorporated into the compliance zone so that groundwater contaminant movement away from the Site can be identified through on-site monitoring before it moves beyond the Compliance Boundary and into abutting properties. An additional restricted buffer zone to prevent the installation of groundwater extraction wells that might draw contaminated groundwater out from the compliance zone will be established beyond the compliance boundary.

O15: Commenter expressed concern that the hydrology of the Site, which includes mounding of groundwater in the overburden aquifer, makes it difficult to predict the movement of groundwater on the Site. Commenter expressed concern that removing the contaminated sediment would allow contaminated surface water to interact with contaminated groundwater, resulting in migration of contamination off-site. Commenter suggested that as part of the cleanup, EPA identify all private well owners in the area, alert them of the potential risks of using those wells, and provide Town water hookups at no expense to those who want them. Commenter also requested that wetlands reconstruction include an impervious layer.

EPA Response: *There are many monitoring wells and piezometers spread throughout the Iron Horse Park Site. Groundwater level elevations have been measured at the locations numerous times. The resulting data has lead to groundwater flow direction conclusions that have been very consistent over time. EPA feels that even though there is uncertainty associated with any data, groundwater movement in the area is pretty well understood and documented.*

Over most of the Site, groundwater is currently discharging to surface water, and no unacceptable human health or ecological risk has been identified due to exposure to surface water at the Site.

EPA has no evidence of off-site groundwater impacts. As such, private wells that are beyond the Compliance Zone Boundary have no documented contamination due to the Site. The groundwater monitoring program called for in the remedy is intended to demonstrate and ensure that off-site groundwater impacts are not occurring. An additional restricted buffer zone to prevent the installation of groundwater extraction wells that might draw contaminated groundwater out from the compliance zone will be established beyond the compliance boundary, but within the Site, as well.

At locations in the B&M Pond where unacceptable ecological risk exists due to exposure to contaminated sediments, the sediments will be excavated. At that point, wetland restoration (replacement of wetland soil and planting of wetland vegetation) can occur. As the contamination will have been removed, there will be no need to place a cap over the remaining sediments.

<u>O16:</u> Commenter requested that EPA reduce the number of truckloads required to remove contaminated sediment and expressed support for removing the material by rail.

EPA Response: *If landfills associated with OU3 of Iron Horse Park are available, EPA will assess at the remedial design stage if contaminated sediments can be disposed of on-site. If this is not feasible, the potential for rail transport will be examined. If truck transport is necessary, EPA will work with local officials regarding transport routes, and associated issues. At the estimated volume of 7,400 cubic yards of contaminated sediment, between 200 and 350 truckloads would be required to transport the sediment off-site.*

<u>O17:</u> Commenter noted that a survey of residents that are currently using groundwater is essential. Commenter also asked how the monitoring results will be made available to the public and who will be doing the monitoring.

EPA Response: *EPA does not have evidence of migration of Site groundwater contamination beyond the Compliance Boundary. EPA has consulted with Billerica Water Department regarding the existence of water mains and the potential for the existence of private wells on streets to the east and north of the Site. EPA will consider a voluntary survey in an attempt to further identify private wells that may exist in these areas.*

Site monitoring results will be made available to the public at the local information repository (Billerica Public Library), and on-line at www.epa.gov/region1/superfund/sites/ironhorse.

<u>O18:</u> Commenter reported that he has an artesian well and asked if EPA would test his well.

EPA Response: *The well in question is located approximately 1,200 feet north of the Site. EPA does not have evidence of groundwater migration beyond the Compliance Boundary. The groundwater monitoring program called for in the remedy is intended to demonstrate and ensure that off-site groundwater impacts are not occurring. If in the future, data suggests that groundwater from the Site may be impacting off-site wells, the wells will be sampled. However, a sufficient monitoring zone has been incorporated into the Compliance Zone so that any movement of contaminated groundwater can be identified and addressed before it leaves the Site. An additional restricted buffer zone to prevent the installation of groundwater extraction wells that might draw contaminated groundwater out from the compliance zone will be established beyond the compliance boundary, within the Site.*

<u>O19:</u> Commenter was surprised the cleanup of the Site was going to take another 20 years and expressed a preference for the 5 year option (alternative SD-6).

EPA Response: *The desire for a faster cleanup is certainly understandable. However, EPA believes that Monitored Natural Recovery (even with the longer projected cleanup time) provides the best balance of the issues regarding cleanup of the Unnamed Brook portion of the Site. First, there is no human health risk associated with Unnamed Brook sediment. Second, the ecological risk is described as moderate in the conclusion section of the Ecological Risk Assessment. Third, there is little evidence of downstream contaminant migration. Fourth, data demonstrating decreasing levels of contamination supports choosing Monitored Natural Recovery at the Unnamed Brook. The above do not support the wetland disruption or expense associated with sediment excavation for the areas of waterways where Monitored Natural Recovery will be utilized.*

<u>O20:</u> Commenter noted that both the Shawsheen River watershed and the Concord River watershed are affected by the Site and requested that monitoring of groundwater be extended beyond what is required by the proposed plan.

EPA Response: *EPA does not believe that there is a link between the Iron Horse Park Site and the Concord River watershed. Surface water and groundwater from the Site do not flow towards* *the Concord River. East of High Street, the Middlesex Canal is part of the Shawsheen River watershed. However, the Baseline Risk Assessment did not identify any unacceptable risks (human health or ecological) associated with exposure to surface water on-site. Unacceptable ecological risk from exposure to sediment was identified at the B&M Pond and the Unnamed Brook within the Site. However, sediment risk does not extend downstream beyond the B&M Pond.*

The purpose of the groundwater monitoring portion of the remedy is to ensure that contaminated groundwater from the Site does not migrate beyond the Compliance Zone. No risks associated with exposure to groundwater, have been identified outside of the Compliance Zone. At this time, EPA does not believe that there is justification for adding additional monitoring wells beyond the monitoring need already described since the Compliance Zone includes a sufficient buffer zone to detect any movement of contaminated groundwater from the Site before it reaches the Site boundary.

<u>O21:</u> Commenter purchased a house and was not told that it was near contamination and wanted to state that EPA should make decisions so that it is not another 20 years before an opportunity to comment.

EPA Response*: Unfortunately, there is no formal mechanism for notifying prospective property purchasers of the presence of a nearby Superfund Site. Regarding the Iron Horse Park Superfund Site, all contamination from the Site, whether in soil, sediment, or groundwater, occurs entirely within the boundaries of the Site, so homeowners living in the vicinity are not at risk. EPA does conduct community outreach in the form of mailings to the site mailing list, press releases regarding site updates, updates to Town boards, and public informational meetings. At particular times (such as announcing the availability of the Proposed Plan and the Public Comment Period) EPA also places notices in local newspapers. Information about the Site is available at the local information repository (Billerica Public Library), and on-line at www.epa.gov/region1/superfund/sites/ironhorse.*

<u>Comments submitted by Malcolm Pirnie (for MBTA) – a Potentially Responsible Party (PRP)</u>

<u>Note:</u> Many comments in the package submitted on behalf of MBTA spoke to whether contamination associated with MBTA property or activities, contributed to risk at OU4. As those portions of the package did not comment on the Proposed Plan (proposed remedy), they are not addressed in the Responsiveness Summary.

<u>Comment 1:</u> The $4.1 million proposal to remove sediment from the Pond is excessive and unnecessary to address contaminated sediment and will harm wetlands and surface water that EPA should be protecting.

***EPA Response**: The estimated cost for the entire sediment part of the remedy is $4.1 million, which includes both sediment excavation within the B&M Pond, and Monitored Natural Recovery for sediments exceeding risk level that are not excavated. The estimated capital cost for just the Pond excavation and off-site disposal is $3.42 million. The amount of sediment to be removed from the B&M Pond identified within this Record of Decision was conservatively estimated based on a limited number of samples in the pond. Pre-design studies will be performed to refine the extent of sediment removal necessary, as well as the most efficient and cost-effective removal methods which will also provide the least impact to the wetlands. Wetland impacts will be mitigated, as necessary.*

<u>Comment 2:</u> Proposed groundwater monitoring is excessive and unnecessary in light of available data that show no off-site risks.

***EPA Response**: It is necessary to confirm that off-site migration of groundwater contaminants (beyond the Compliance Zone) is not occurring. Additionally, monitoring will be performed to determine if any significant changes occur in the groundwater. There may be an overlap of monitoring locations with those required by the OU3 Source Control remedy. This may reduce the overall number of locations initially included in the OU4 monitoring program.*

<u>Comment 3:</u> Dewatering and removing sediment from the entire pond is not well supported by the data. One sediment sample location has concentrations below PRGs, two sediment sample locations have concentrations above PRGs. The sample locations with concentrations above PRGs are very close to the B&M Landfill. Comment recommends targeting sediment excavation "in the wet" where PRG exceedances occur and suggests that the removal would be limited to less than 1,200 cubic yards.

***EPA Response**: See response to Comment 1. It is not clear how Malcolm Pirnie (for MBTA) determined that the removal would be limited to less than 1,200 cubic yards, but EPA agrees that pre-design studies could determine that the volume to be removed might be smaller than the estimate utilized for costing purposes (the volume also might be larger than the estimate). Under this remedy, the amount of sediment eventually to be removed will be based on identified contaminant levels in the B&M Pond.*

<u>Comment 4:</u> Contaminants detected in the B&M Pond near the B&M Landfill, indicate that the landfill is the likely source of pond contamination.

***EPA Response**: EPA agrees that the B&M Railroad Landfill is likely a primary source of pond contamination, but also notes that other sources have potentially contributed, such as surface runoff from surrounding areas and inflow from neighboring wetlands/streams.*

<u>Comment 5:</u> Analytical data in B&M Pond suggests that contaminants have not migrated from the edge of the B&M Landfill to a significant extent. Capping the landfill (as part of OU3) will

prevent further contaminant release and monitoring in the pond will measure the effectiveness of the capping and whether capping is sufficient to address ecological risk. This supports choosing source control (landfill capping) and MNR as the remedy at the B&M Pond.

EPA Response: *Although the highest contaminant concentrations have been detected near B&M Railroad Landfill, there are not enough data points in B&M Pond to determine the extent of contamination and if there are higher concentrations elsewhere in the pond. EPA agrees that capping the landfill as part of the OU-3 remedy will reduce contaminant migration from the landfill to the pond in the future. However, based on available data, evidence (data showing reduction of contaminant concentrations in sediment over time) is lacking which would support Monitored Natural Recovery as an appropriate remedy for B&M Pond. Unacceptable ecological risk exists which requires an action beyond Monitored Natural Recovery.*

<u>Comment 6:</u> EPA has been studying groundwater at Iron Horse Park for over 20 years and has, to date not identified a significant risk associated with groundwater.

EPA Response: *There is an unacceptable risk to future residents using the groundwater currently under the site as a drinking water source. At this time, there is neither on-site use of this groundwater, nor evidence of the migration of groundwater contaminants off-site at unacceptable levels. However, it is necessary to monitor the groundwater to ensure that off-site contaminant migration does not occur at unacceptable concentrations and that significant changes do not occur in the on-site groundwater. Furthermore the remedy requires Institutional Controls to restrict future groundwater use/well installation and residential development to prevent any on-site exposure.*

<u>Comment 7:</u> A monitoring program is not necessary to evaluate the presence and migration of arsenic and manganese as they are likely naturally occurring, and elevated levels were detected in upgradient wells.

EPA Response: *As the on-site concentrations of arsenic and manganese were generally higher than those detected in upgradient wells, it appears that the concentrations are potentially associated with source areas and minor releases which have established reducing conditions in the aquifer underneath the Site. The concentrations of these contaminants are anticipated to be lowered when compared to those found in upgradient wells over time, as the aquifer conditions change due to attenuation of contaminants following implementation of the source control remedies under the OU3 remedy.*

<u>Comment 8:</u> Contaminants of Concern (COCs) (other than arsenic and manganese) do not significantly exceed PRGs, so a monitoring program is more extensive than is needed for the low contaminant levels that exist.

***EPA Response**: EPA agrees that most detections of COCs do not significantly exceed performance standards. However, contaminant concentrations greater than the performance standards still contribute to an unacceptable risk in groundwater and require monitoring to ensure the area of exceedances remain within the Compliance Zone.*

Comment 9: With the exception of two contaminants, COCs at downgradient wells are below PRGs.

***EPA Response**: This comment and the discussion associated with it focuses on specific areas of the property related to MBTA ownership. To clarify, there are multiple downgradient on-site wells with exceedances of performance standards. The monitoring program utilized for cost-estimating purposes did not consider property ownership, but rather the need to monitor site-wide conditions.*

Comment 10: It is unlikely that COCs in excess of PRGs will affect areas beyond the Compliance Zone Boundary. Therefore an extensive groundwater monitoring program is not necessary.

***EPA Response**: EPA agrees that it is unlikely that contaminant concentrations will migrate from the site at levels which generate an unacceptable risk to nearby residents. However, the groundwater monitoring program must be established to confirm this and ensure that this does not occur in the future. Additionally, the monitoring program will determine if any significant changes occur in the on-site groundwater (this may also be tied to assessing the effectiveness of the OU3 source control remedy).*

Comment 11: There is no reason to believe that groundwater results will be different in the future. A targeted groundwater monitoring program is all that is needed and would not require the installation of 15 new and expensive wells.

***EPA Response**: While most of the COCs have low mobility, some of the more mobile contaminants will be impacted by the source control remedies implemented under OU3. Changes to contaminant concentrations are possible and need to be monitored. Furthermore, new well installation is needed to fill data gaps, especially near Pond Street and in the bedrock flow zone, which, if off-site contaminant migration were to occur, would be the most likely pathway.*

Summary of Comments Received in 11/3/10 Letter from Environmental Resources Management (ERM) on behalf of Pan Am Railways (a PRP)

Comment 1: Sample location SED-05 is located within the footprint of the area to be excavated and consolidated as part of the remedy for the B&M Landfill addressed by the Operable Unit 3

(OU3) remedy. A holistic approach needs to be developed for the B&M Pond and B&M Landfill.

***EPA Response**: The OU3 remedy, which includes the B&M Landfill, addresses source areas in Iron Horse Park. While some landfill waste material has spilled into the B&M Pond and may be wet, it is still landfill material, not sediment. OU4 addresses sitewide surface water, sediment and groundwater. Until the pre-design sampling is conducted to characterize the extent of contaminated sediments in B&M Pond that exceed cleanup levels, it is not possible to determine how much sediment must be excavated, and where that sediment is located. At the present, the Settling Parties that entered into a Consent Decree with the governments to perform the OU3 remedy are not obligated, per the settlement, to address the sediment or groundwater remedy.*

Comment 2: How were the results from toxicity testing performed at sampling locations SED-06 and SED-07 factored into the decision to excavate 200,000 square feet of sediment from B&M Pond? The results from these locations suggest that impacts are not uniform throughout the B&M Pond.

***EPA Response**: The amount of sediment to be removed from the B&M Pond was conservatively estimated based on a limited number of samples in the pond. Pre-design studies will be performed to refine the extent of sediment removal necessary, as well as to help identify the most efficient and cost-effective methods of removal which will also provide the least impact to the wetlands. EPA expects that contaminant levels likely are not uniform throughout the B&M Pond.*

Comment 3: ERM requested additional time to review the existing data and studies.

***EPA Response**: The Public Comment Period was extended until January 14, 2011. Notice of the extension was published in the Billerica Minuteman and the Lowell Sun. In addition, notice of the extension was sent to all parties on the Iron Horse Park mailing list as well as representatives of responsible parties at the Site. As a result, EPA determined that no further extension was warranted.*

Appendix A

State Concurrence

MassDEP
Commonwealth of Massachusetts
Executive Office of Energy & Environmental Affairs

Department of Environmental Protection

One Winter Street Boston, MA 02108 • 617-292-5500

July 22, 2011

James T. Owens, III, Director
Office of Site Remediation and Restoration
U.S. EPA
5 Post Office Sq., Suite 100
Mail Code: OSRR 07-1
Boston, MA 02109

Re: State ROD Concurrence Letter
Operable Unit #4
Iron Horse Park Superfund Site

Dear Director Owens:

The Department of Environmental Protection (the Department or MassDEP) has reviewed the Remedial Action alternative selected by the Environmental Protection Agency (EPA) for the cleanup of the Fourth Operable Unit at the Iron Horse Park Superfund Site, in Billerica. The selected alternative addresses sediment and groundwater contamination within the Iron Horse Park Site, as described below. The Department concurs with EPA's selection of this alternative for this operable unit (the selected remedy).

The selected remedy has four components:

- Excavate and dispose of sediment from the B&M Pond and install stormwater controls;
- Use Monitored Natural Recovery and install stormwater controls to address contaminated sediment in the Unnamed Brook and associated wetlands;
- Monitor groundwater to confirm that contaminants do not move beyond a site-wide "Compliance Boundary;"
- Implement Institutional Controls to ensure on-site groundwater is not used for drinking water purposes and to ensure stormwater controls are maintained.

Based on the remedial actions of excavation, monitored natural recovery, and monitoring of groundwater, the Department believes that the selected alternative will be protective of human health and the environment, and that the remedy is consistent with a comprehensive solution for the Iron Horse Park site.

The Department looks forward to working with you in implementing the selected remedy. If you have any questions, please contact Janet Waldron at (617) 556-1156.

Very truly yours,

Paul W. Locke
Acting Assistant Commissioner
Bureau of Waste Site Cleanup

E-file: \05_01_Correspondence\2011_0712_DEP_ConcurrenceLetter_OU4

Appendix B

TSCA Finding

Attachment B - TSCA 40 CFR Section 761.61(c) Determination

Based on historical industrial activity at the Iron Horse Park Superfund Site, Billerica, MA (the Site), PCB-contaminated sediments likely meet the definition of a PCB remediation waste as defined under 40 CFR Section 761.3 and thus are regulated for cleanup and disposal under 40 CFR Part 761.
In accordance with the requirements under the Toxic Substances Control Act (TSCA) and 40 CFR Section761.61(c), I have reviewed the Administrative Record for the Site and considered the dredging, passive dewatering, and off-site disposal of PCB-contaminated sediment set out in the July 2011 Record of Decision (ROD) for the fourth operable unit of the Iron Horse Park Superfund Site. The ROD's plan includes dredging, passive dewatering and either off-site or on-site disposal of PCB-contaminated sediment exceeding one (1) part per million from the B&M Pond on the Site. Based on the information provided, the ROD's plan to address PCB remediation waste at the Site will not pose an unreasonable risk of injury to health or the environment as long as the following conditions are met:

1. That all Site sediment exceeding the ROD's PCB cleanup standard of one (1) part per million will be dredged from the Site and disposed of at a suitable licensed off-site disposal facility or at an on-site facility that is part of Operable Unit #3 and that meets TSCA protectiveness standards under 40 C.F.R. 761.61(c).

2. Before EPA chooses to dispose of any sediment exceeding TSCA risk-standards at an OU3 disposal facility, EPA will issue an OU3 CERCLA decision document that finds that the disposal of the sediment will not pose an unreasonable risk of injury to health or the environment.

3. Water quality monitoring shall be performed during the dredging, passive dewatering and on-site management of dredged sediment to ensure that turbidity and toxicity levels comply with the performance criteria in the ROD.

4. Air monitoring and, if appropriate, dust suppression measures shall be implemented to ensure that airborne PCB levels from the dredging, passive dewatering, and management of dredged sediment prior to off-site disposal are below levels of concern, as established in the ROD.

2/25/11

James T. Owens, III
Director, Office of Site Remediation and Restoration

Date

Appendix C - Figures - Contents

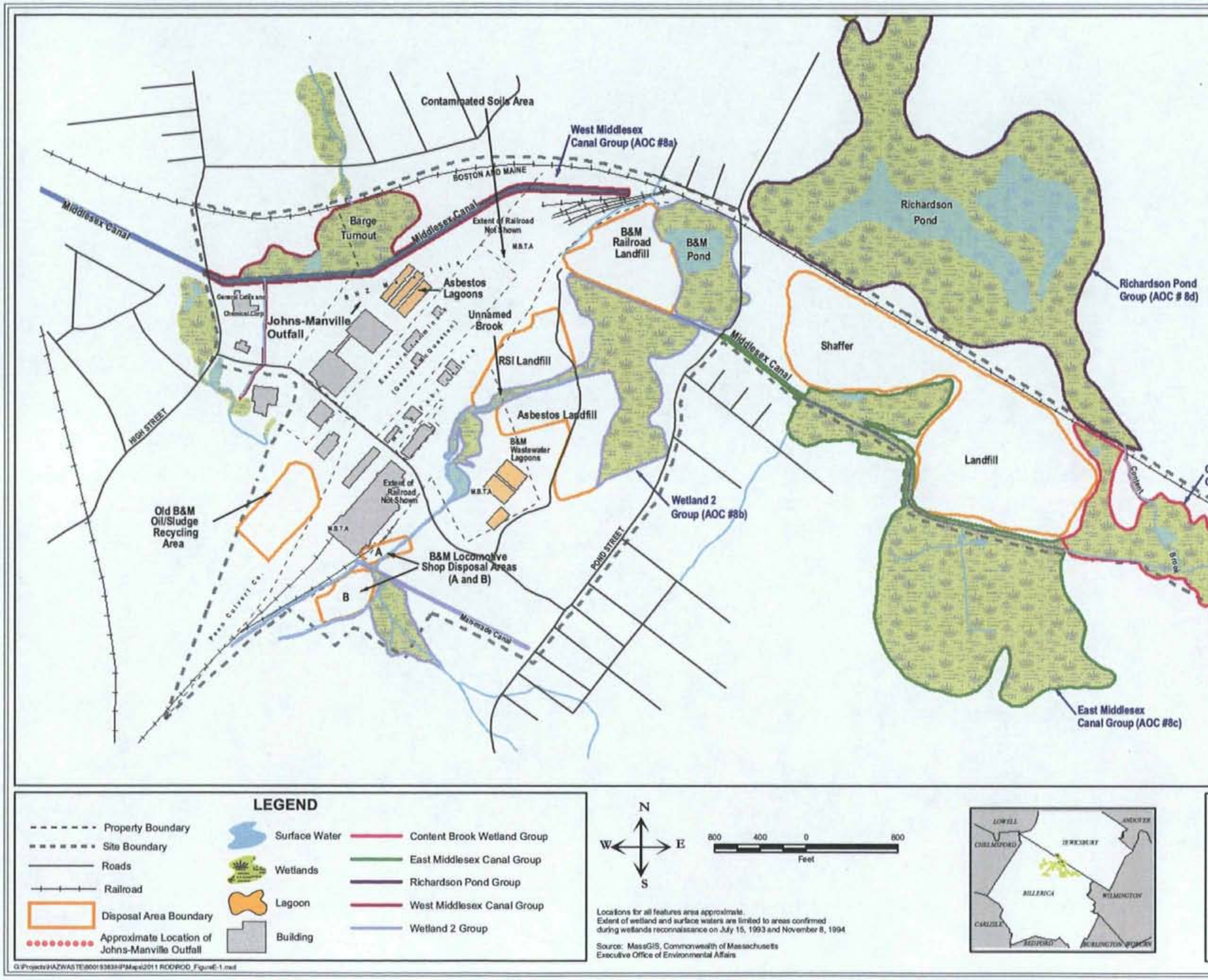
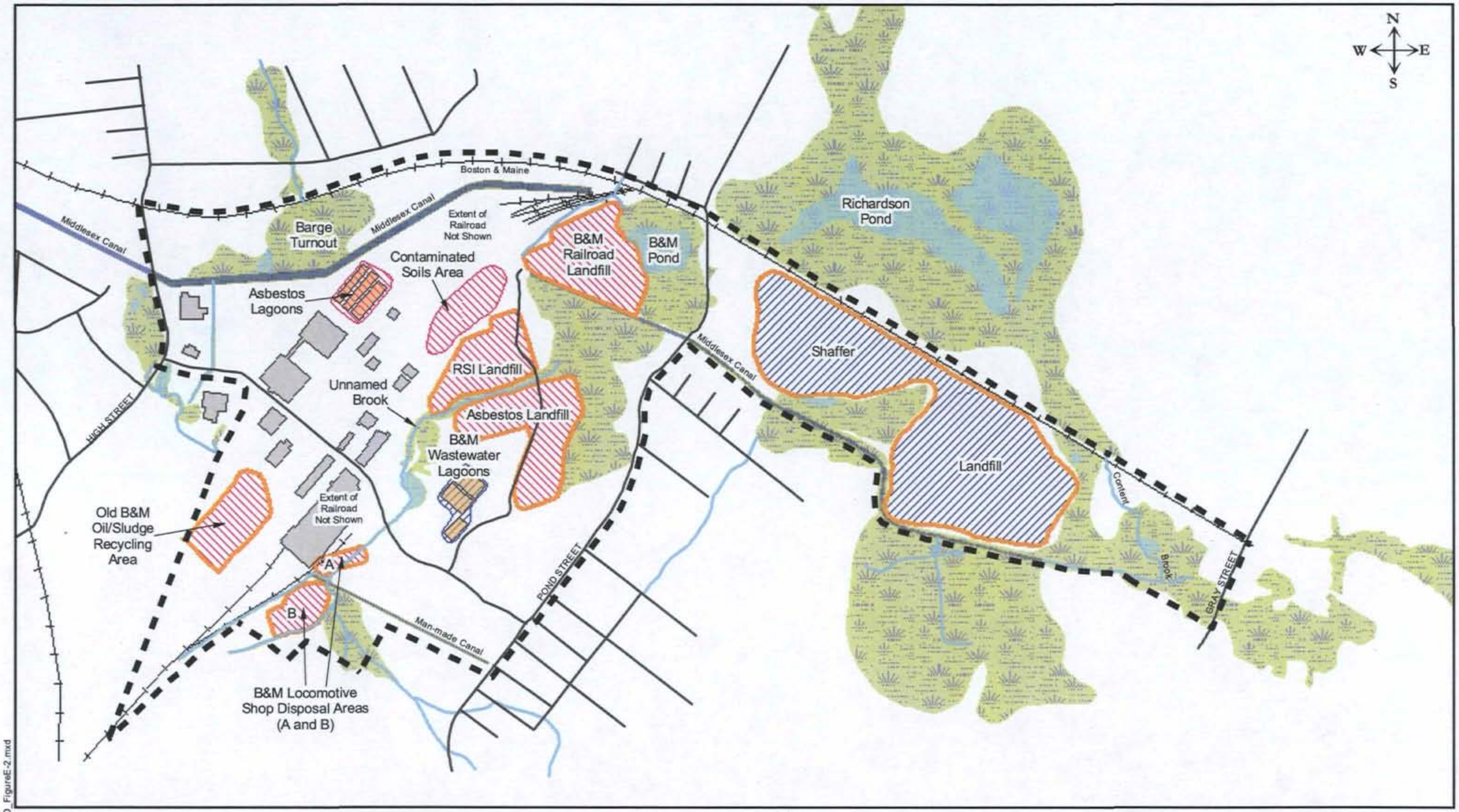


FIGURE E-1

SITE MAP

Iron Horse Park Superfund Site
4th Operable Unit
North Billerica, MA



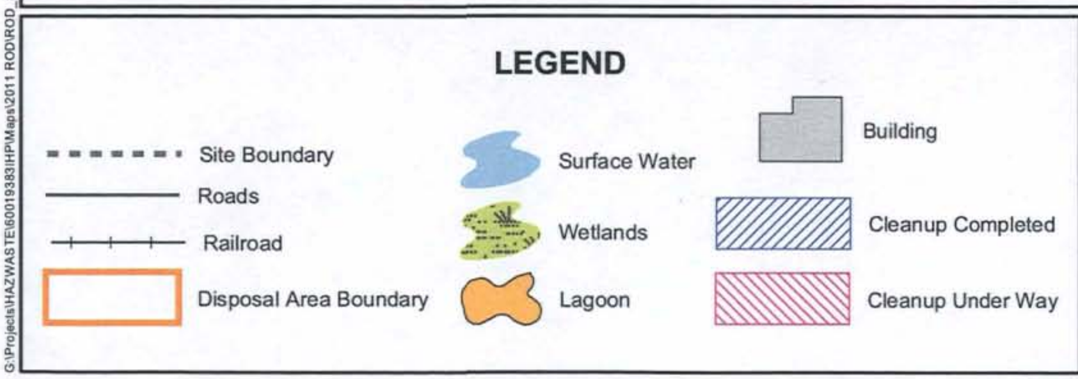


FIGURE E-2

Iron Horse Park Superfund Site Map

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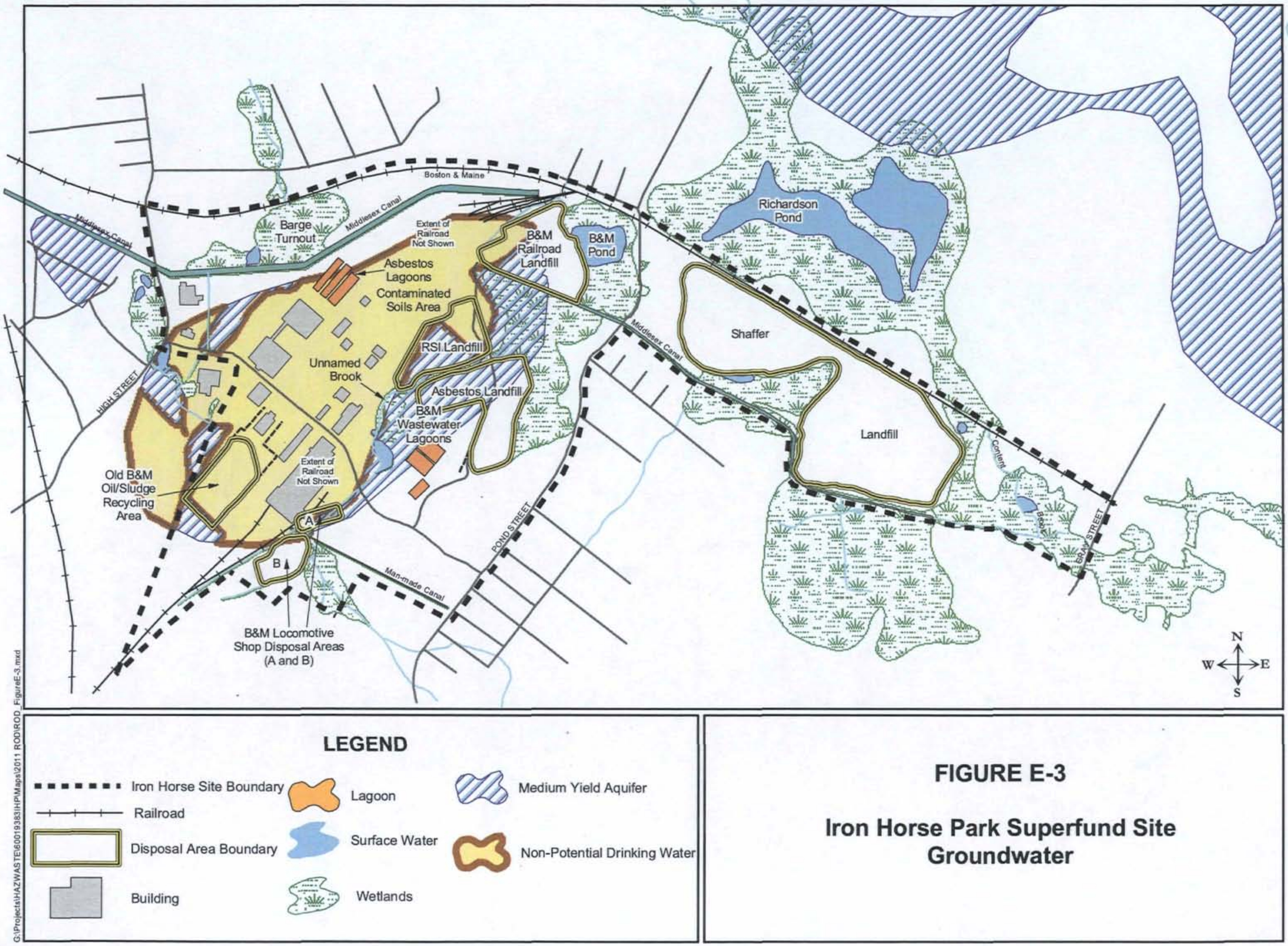
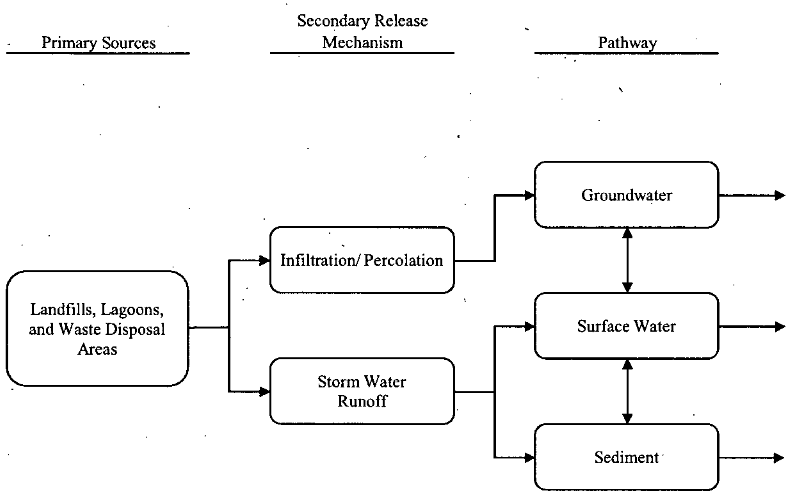


FIGURE E-3

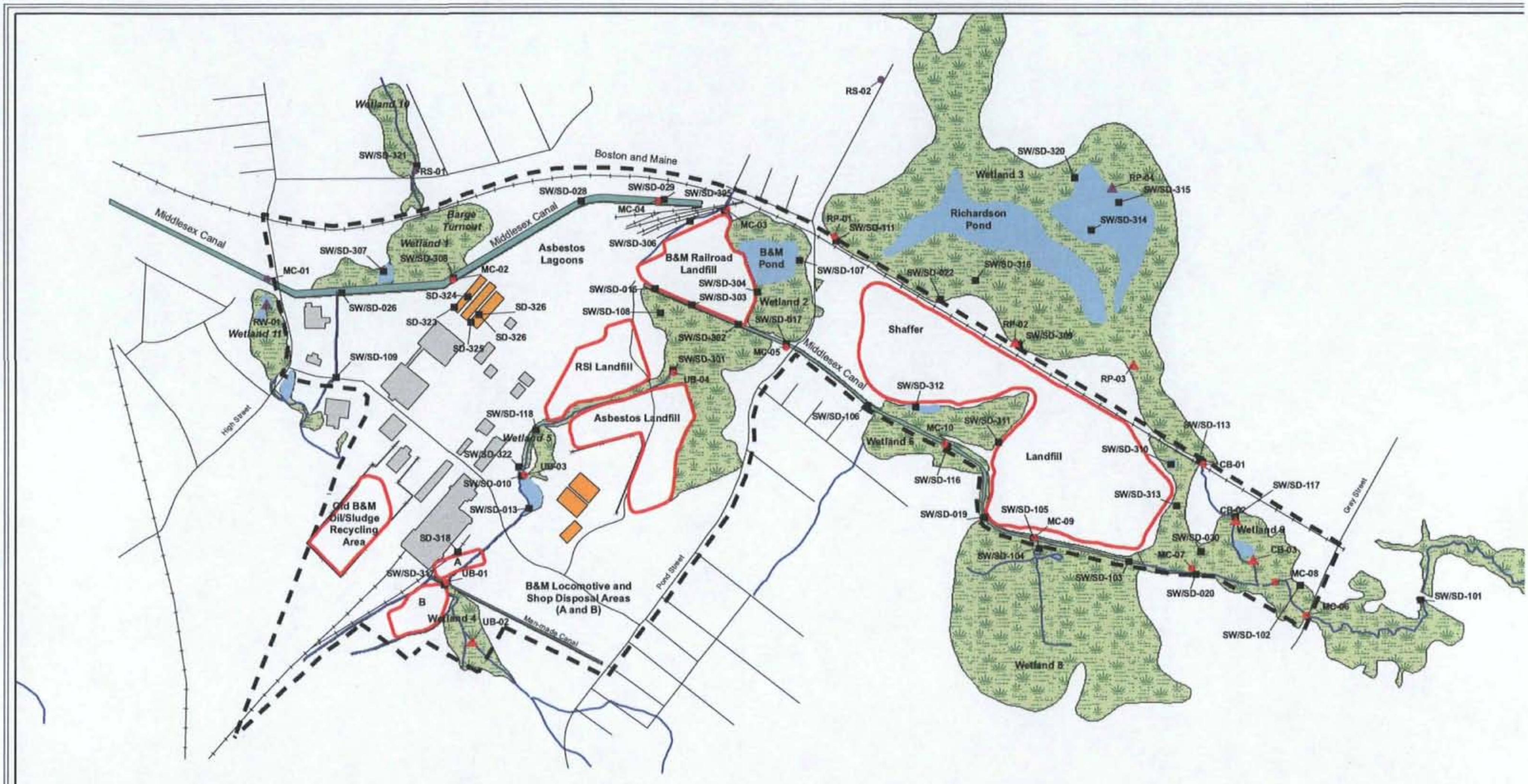
Iron Horse Park Superfund Site Groundwater

FIGURE E-4. CONCEPTUAL SITE MODEL FOR CONTAMINATED GROUNDWATER, SURFACE WATER, AND SEDIMENT



		Human Health Receptors				Ecological Receptors		
Pathway	Exposure Route	Site Trespasser	Site Workers	Construction Workers	Area Residents	Benthic Invertebrates	Aquatic Receptors*	Predatory Birds
Groundwater	Ingestion			•	•			
	Inhalation		•	•	•			
	Dermal			•	•			
Surface Water	Ingestion					•	•	•
	Inhalation							
	Dermal	•				•	•	
Sediment	Ingestion	•				•	•	•
	Inhalation							
	Dermal	•				•	•	

* Aquatic receptors include zooplankton and fish



LEGEND

Road	Surface Water	Surface Water/Sediment Station
Railroad	Wetland	Lentic Station
Stream	Lagoon	Lentic Reference Station
Fence	Building	Lotic Station
Disposal Area boundary	Canal	Lotic Reference Station
Iron Horse Site Boundary		

Locations for all features area approximate.
Extent of wetland and surface waters are limited to areas confirmed during wetlands reconnaissance on July 15, 1993 and November 8, 1994

Source: MassGIS, Commonwealth of Massachusetts Executive Office of Environmental Affairs

FIGURE E-5.

1997 BERA BENTHIC INVERTEBRATE AND SEDIMENT SAMPLING LOCATIONS

Iron Horse Park Superfund Site
4th Operable Unit
North Billerica, MA

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LEGEND

- Property Boundary
- Railroad
- Disposal Area Boundary
- Building
- Lagoon
- Surface Water
- Wetlands
- 2004 Sediment Sampling Location

N
W E
S

800 400 0 800
Feet

Locations for all features area approximate.
Extent of wetland and surface waters are limited to areas confirmed during wetlands reconnaissance on July 15, 1993 and November 8, 1994

Source: MassGIS, Commonwealth of Massachusetts
Executive Office of Environmental Affairs

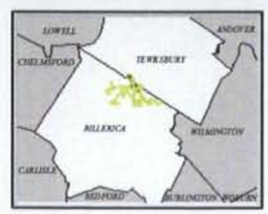

FIGURE E-6.

2004 ERA/WRIA SEDIMENT SAMPLING LOCATIONS FOR SCREENING-LEVEL ANALYSIS

Iron Horse Park Superfund Site
4th Operable Unit
North Billerica, MA

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FIGURE E-7.

2004 ERA/WRIA REFERENCE SEDIMENT, SURFACE WATER, AND FISH SAMPLING LOCATIONS

Iron Horse Park Superfund Site
4th Operable Unit
North Billerica, MA

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LEGEND

- Property Boundary
- Railroad
- Disposal Area Boundary
- Building
- Lagoon
- Surface Water
- Wetlands
- 2004 Fish Sampling Location
- 2004 Sediment Sampling Location
- 2004 Surface Water Sampling Location

N W E S

800 400 0 800 Feet

Locations for all features area approximate.
Extent of wetland and surface waters are limited to areas confirmed during wetlands reconnaissance on July 15, 1993 and November 8, 1994

Source: MassGIS, Commonwealth of Massachusetts Executive Office of Environmental Affairs

FIGURE E-8.

2004 ERA/WRIA SEDIMENT, SURFACE WATER, AND FISH SAMPLING LOCATIONS FOR LABORATORY ANALYSIS

Iron Horse Park Superfund Site
4th Operable Unit
North Billerica, MA

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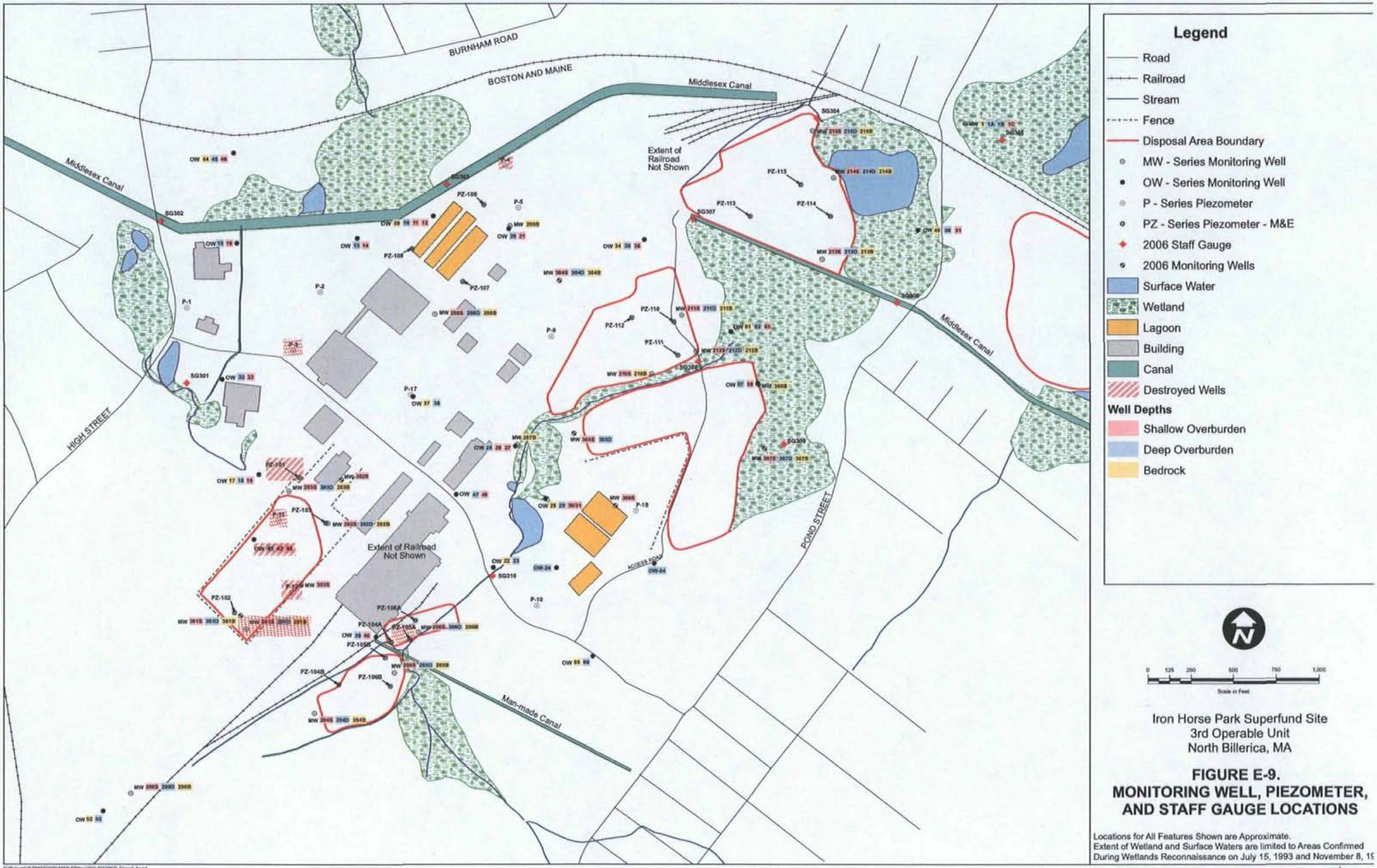


Iron Horse Park Superfund Site
3rd Operable Unit
North Billerica, MA

FIGURE E-9.
MONITORING WELL, PIEZOMETER, AND STAFF GAUGE LOCATIONS

Locations for All Features Shown are Approximate.
Extent of Wetland and Surface Waters are limited to Areas Confirmed
During Wetlands Reconnaissance on July 15, 1993 and November 8, 19

METCALF&EDDY | AEC

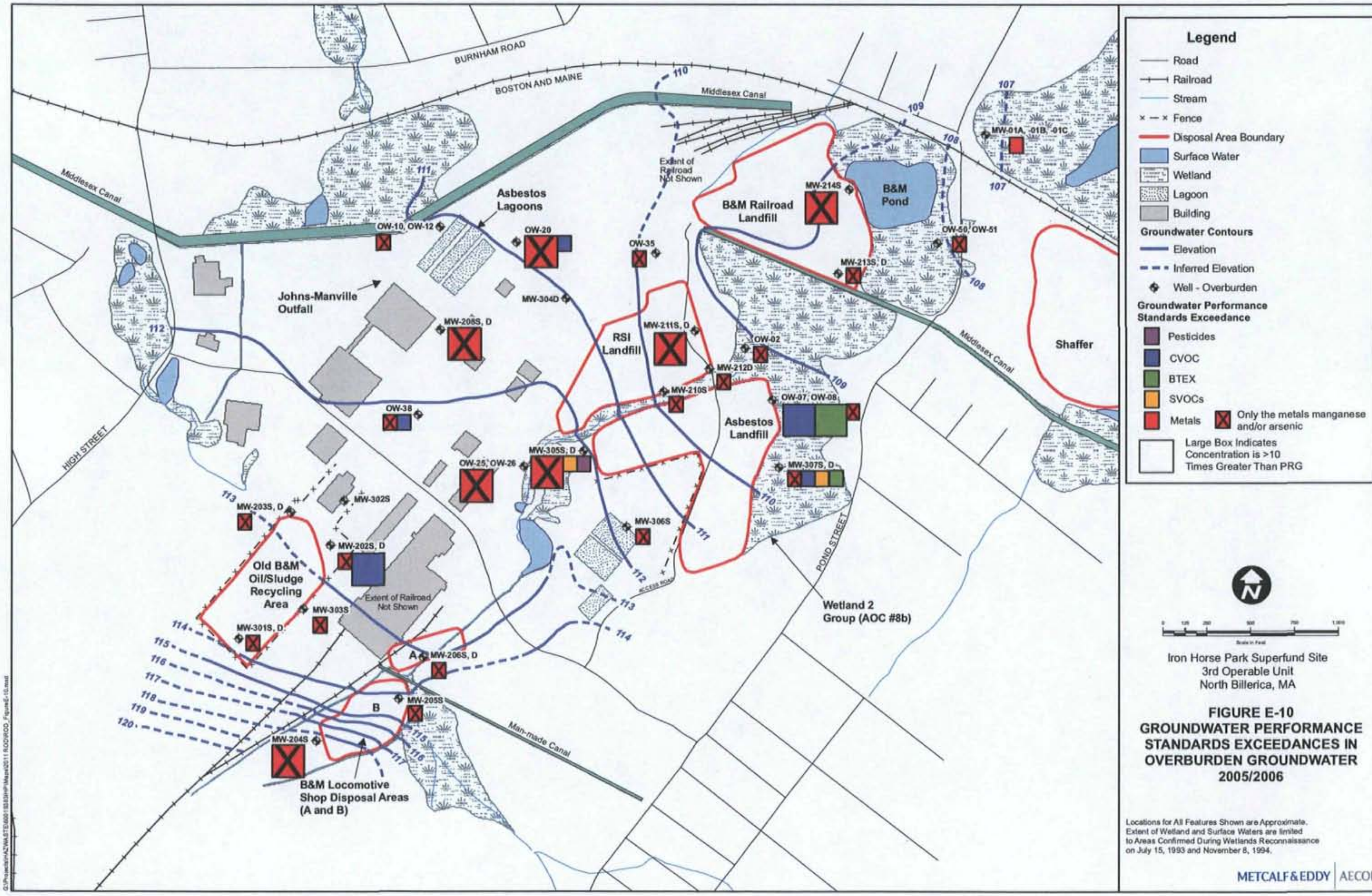
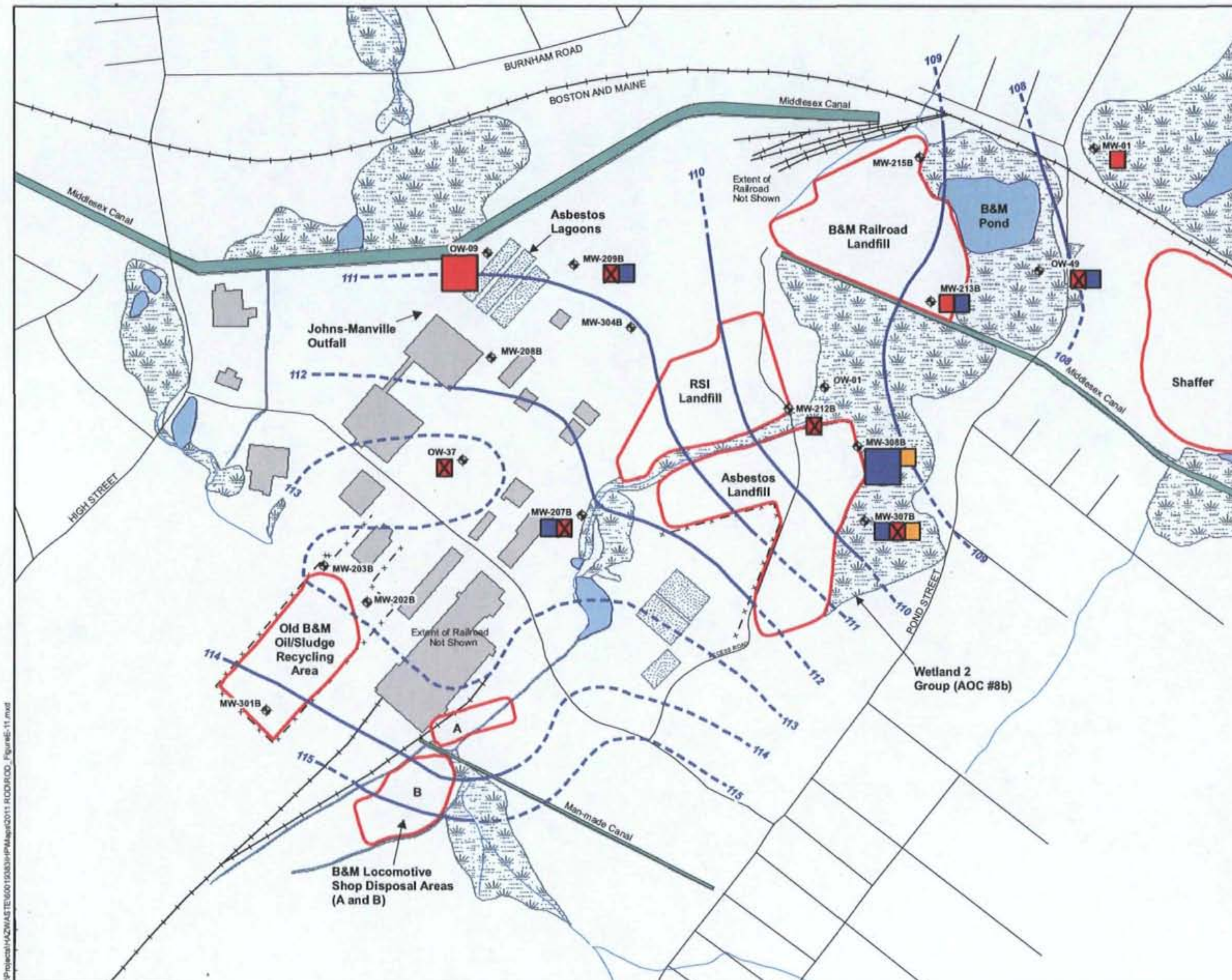


FIGURE E-10
GROUNDWATER PERFORMANCE STANDARDS EXCEEDANCES IN OVERBURDEN GROUNDWATER 2005/2006



Iron Horse Park Superfund Site
3rd Operable Unit
North Billerica, MA

FIGURE E-11
GROUNDWATER PERFORMANCE STANDARDS EXCEEDANCES IN BEDROCK GROUNDWATER 2005/2006

Locations for All Features Shown are Approximate. Extent of Wetland and Surface Waters are limited to Areas Confirmed During Wetlands Reconnaissance on July 15, 1993 and November 8, 1994.

METCALF&EDDY | AECOM

LEGEND

Road	Surface Water
Railroad	Lagoon
Stream	Building
Fence	Canal
Disposal Area boundary	Wetland
Iron Horse Site Boundary	
Extent of Sediment Potentially Requiring Remediation	

□ 1993 Sediment Sampling Location

○ 2004 Sediment Sampling Location

N W E

0 200 400 800 1,200 1,600

Feet

Locations for All Features Shown are Approximate. Extent of Wetland and Surface Waters are Limited to Areas Confirmed During Wetlands Reconnaissance on July 15, 1993 and November 8, 1994.

FIGURE L-1.

ASSUMED EXTENT OF SEDIMENT POTENTIALLY REQUIRING REDMEDIATION

Iron Horse Park Superfund Site
North Billerica, MA

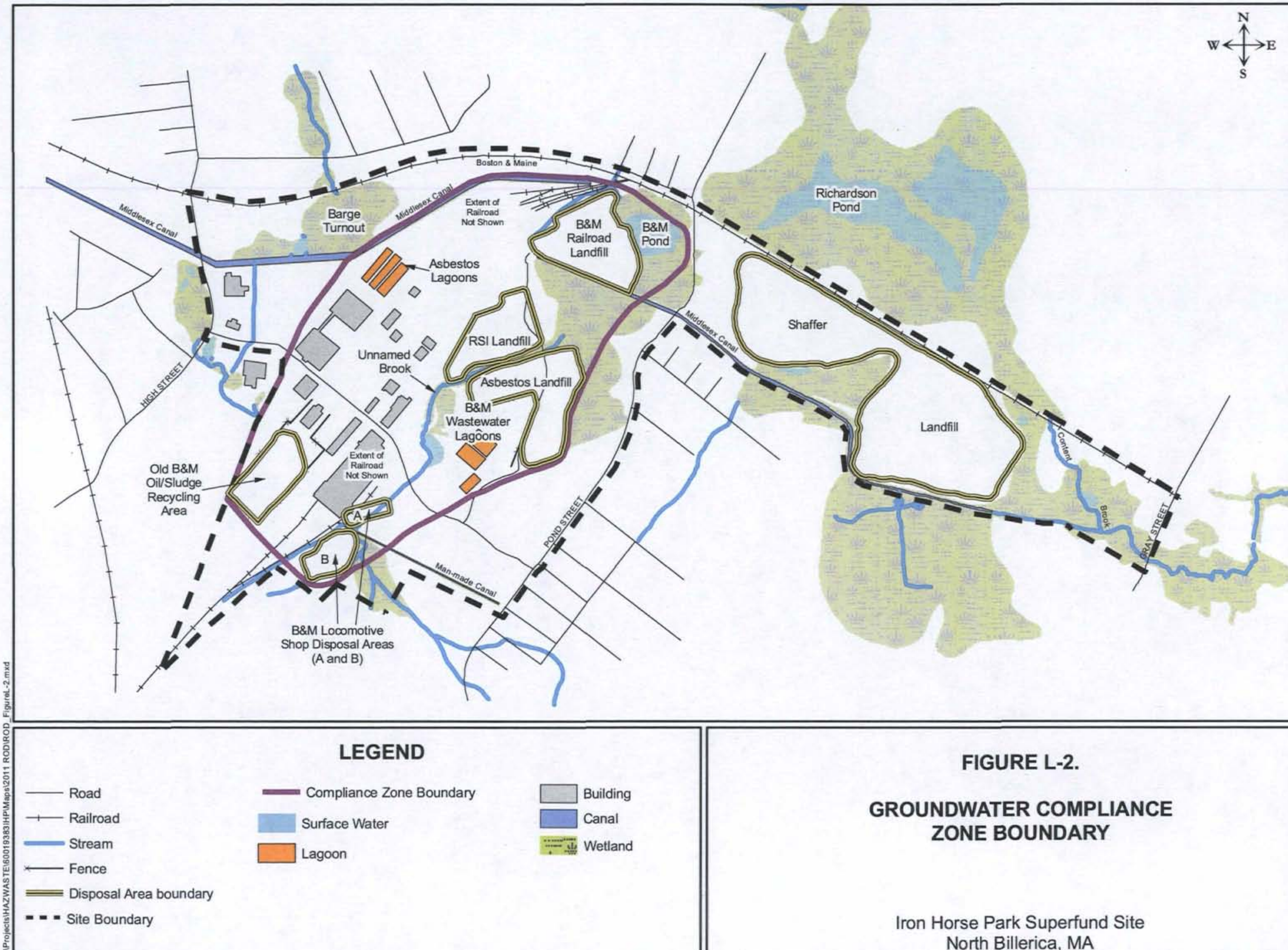


FIGURE L-2.

GROUNDWATER COMPLIANCE ZONE BOUNDARY

Iron Horse Park Superfund Site
North Billerica, MA

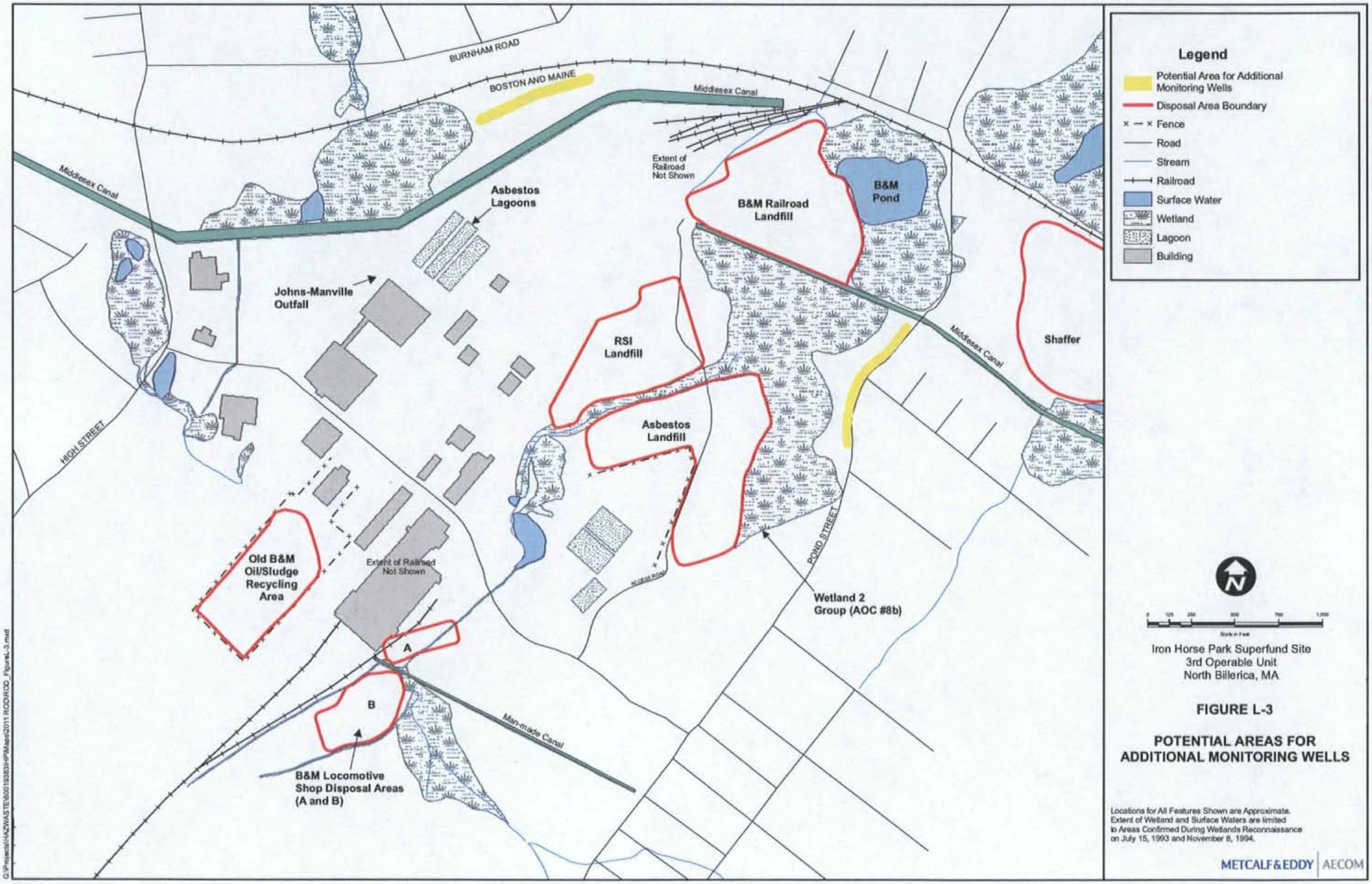


FIGURE L-3

POTENTIAL AREAS FOR ADDITIONAL MONITORING WELLS

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Appendix D - Tables – Contents

TABLE E-1. NOTABLE DETECTIONS AND OBSERVATIONS OF WINTER 2005-2006 GROUNDWATER MONITORING ROUND

Well ID	Original Selection Rationale (based on historical monitoring data)	Notable Detections and Observations of Winter 2005-2006 Monitoring Round
Existing Monitoring Wells – "OW" Series		
OW-01	TCE detected at the MCL/Performance Standard (5 µg/L)	TCE now below Performance Standard (1.5 µg/L); detections of 1,1-DCA (1.4 µg/L) and 1,2-DCA (0.74 µg/L); previously detected at 2 µg/L)
OW-02	Mn detected above the Performance Standard	Mn detected at the same magnitude; As above Performance Standard
OW-07	The second highest PCB concentration detected, as well as TCE above the Performance Standard	PCBs now non-detect (ND); TCE reduced from 21 µg/L to 4.6 µg/L; 1,1-DCA (0.34 µg/L); chloromethane (1.6 µg/L); t-1,2-DCE (0.58 µg/L); Mn detected above Performance Standard at similar magnitude to historical results
OW-08	Benzene detected, as well as pesticides	Benzene still detected above Performance Standard, but at 59 µg/L rather than above 300 µg/L; 1,1,1-TCA, 1,1-DCA, and chlorobenzene were previously not detected and are now present at 22, 38, and 46 µg/L, respectively; other miscellaneous VOCs, including BTEX compounds, detected at low concentrations; phenol was the only SVOC detected (5.7 µg/L); pesticides were ND; metals detected at similar magnitude to historical results (Mn and As above Performance Standard)
OW-09	The highest concentration of PCBs detected here	VOCs previously detected (1,1-DCA, 1,2-dichlorobenzene, and 1,2-DCA) decreased in concentration; a few new VOCs detected all at less than 5 µg/L, with most below 1 µg/L; one pesticide (alpha-chlordane) detected (0.0051 µg/L); PCBs were ND; high Mn (22600 µg/L)
OW-10	Mn detected above the Performance Standard	Miscellaneous VOCs and SVOCs detected – none above Performance Standards; metals at similar magnitude to historical results
OW-12	1,1,2,2-Tetrachloroethane detected above the Performance Standard	1,1,2,2-Tetrachloroethane now ND; miscellaneous VOCs, including BTEX compounds, detected at low concentrations (< 2 µg/L); As above Performance Standard; Mn now below Performance Standard
OW-20	Pesticides detected and Mn detected above the Performance Standard	Miscelleanous VOCs detected; TCE and PCE above Performance Standards (7 and 39 µg/L, respectively); pesticides now ND; As and Mn above Performance Standards
OW-25	Tl and Mn detected above the Performance Standards	Miscelleanous VOCs detected; TCE and PCE just below Performance Standards (3.2 and 4.4 µg/L, respectively); Mn above Performance Standard; Tl was ND, but the DL was elevated (5 µg/L) above the Performance Standard of 2 µg/L
OW-26	Pesticides detected	Pesticides now ND; As above Performance Standard
OW-35	Pesticides near the Contaminated Soils Area detected here	No organics detected; Mn at 327 µg/L – previously 306 µg/L (similar to historical)
OW-37	Mn detected above the Performance Standard	Miscellaneous organics detected; Mn similar to historical results
OW-38	A downgradient location from the Oil/Sludge Recycling Area (which had detections of 1,1,1-TCA); Mn detected above the Performance Standard	1,4-Dioxane was ND; VOC detections were higher than most other locations – PCE above Performance Standard (14 µg/L), carbon tetrachloride at 37 µg/L; Mn similar to historical results

TABLE E-1. NOTABLE DETECTIONS AND OBSERVATIONS OF WINTER 2005-2006 GROUNDWATER MONITORING ROUND

Well ID	Original Selection Rationale (based on historical monitoring data)	Notable Detections and Observations of Winter 2005-2006 Monitoring Round
OW-49	Close to off-site; downgradient of B&M Railroad Landfill	1,2-DCA at Performance Standard (5 μg/L; was previously above Performance Standard); TCE still above Performance Standard (7.8 μg/L), but a lot lower than historical values (22-25 μg/L); Mn still above Performance Standard (516 μg/L), but now half of historical results
OW-50	Close to off-site; downgradient of B&M Railroad Landfill; check for 1,4-dioxane in a downgradient location	1,4-Dioxane detected (0.59 μg/L) below State guidance level; Mn still moderate (1350 μg/L)
OW-51	Close to off-site; downgradient of B&M Railroad Landfill	(no historical results) – As and Mn above Performance Standards
Existing Monitoring Wells – "MW" Series		
MW-202B	Check to see if contaminants migrated out of Oil/Sludge Recycling Area	No notable detections
MW-202D	Check to see if contaminants migrated out of Oil/Sludge Recycling Area	No notable detections
MW-202S	Check to see if contaminants migrated out of Oil/Sludge Recycling Area; check surficial aquifer for pesticide detections	High detection of carbon tetrachloride (120 μg/L); miscellaneous VOCs and SVOCs detected; pesticides were ND; As above Performance Standard
MW-203B	Check to see if contaminants migrated out of Oil/Sludge Recycling Area	No notable detections
MW-203D	1,1,1-TCA detected	1,1,1-TCA still detected, but lower (0.16 μg/L); no Performance Standard exceedances; 1,4-dioxane at 2.9 μg/L
MW-203S	1,1,1-TCA detected in MW-203D; check surficial aquifer in the area downgradient of the Oil/Sludge Recycling Area	Mn above Performance Standard; 1,4-dioxane was ND
MW-204S	1,1,2,2-Tetrachloroethane and Mn detected above the Performance Standards	Acenaphthene only organic detected; Mn detected well above the Performance Standard (22400 μg/L)
MW-205S	Check the surficial aquifer in the Locomotive Shop Disposal Areas	Acenaphthene and phenanthrene only organics detected; Mn above Performance Standard
MW-206D	Check the deep aquifer in the Locomotive Shop Disposal Areas	1,2-Dichloropropane and MTBE only organics detected; no Performance Standard exceedances
MW-206S	Check the surficial aquifer in the Locomotive Shop Disposal Areas	MTBE only organic detected; Mn above Performance Standard
MW-207B	Location upgradient of Asbestos Landfill; historical detections of 1,1,1-TCA and 1,2-DCA	Miscellaneous VOCs detected, including TCE and PCE above Performance Standards; 1,1,1-TCA detected at 2.3 μg/L, which is just below the historical detection of 3 μg/L; 1,2-DCA detected at 2.6 μg/L which is less than half of historical results; Mn above Performance Standard; 1,4-dioxane at 1.3 μg/L
MW-208B	BEHP detected above the Performance Standard	BEHP now below Performance Standard; Mn now below Performance Standard
MW-208D	BEHP detected above the Performance Standard	BEHP now below Performance Standard; Mn above Performance Standard
MW-208S	As and Mn detected above the Performance Standards	As and Mn detected at magnitudes similar to historical results

TABLE E-1. NOTABLE DETECTIONS AND OBSERVATIONS OF WINTER 2005-2006 GROUNDWATER MONITORING ROUND

Well ID	Original Selection Rationale (based on historical monitoring data)	Notable Detections and Observations of Winter 2005-2006 Monitoring Round
MW-209B	1,2-DCA and Mn detected above Performance Standards	Both 1,2-DCA and Mn still above Performance Standards, with 1,2-DCA approximately half of historical results
MW-210S	Metal concentrations higher than most other site locations	Similar to historical results; As and Mn above Performance Standards
MW-211D	Metal concentrations higher than most other site locations	Similar to historical results; As and Mn above Performance Standards
MW-211S	Pesticides, Mn, and As concentrations higher than most other site locations	No organics detected; As and Mn reduced in magnitude compared to historical results
MW-212B	Mn detected above the Performance Standard	As and Mn above Performance Standards
MW-212D	1,1,2,2-Tetrachloroethane and manganese detected above the Performance Standards	1,1,2,2-Tetrachloroethane now ND; As and Mn above Performance Standards
MW-213B	Multiple chlorinated VOCs detected above Performance Standards	1,1-DCE and 1,2-DCA now below Performance Standards; TCE still above Performance Standard (16 µg/L), but trending downwards; metals below Performance Standards
MW-213D	Chlorinated VOCs and Mn detected above Performance Standards	1,1-DCE now ND; TCE now below Performance Standard (4.8 µg/L) – down significantly; Mn now below Performance Standard
MW-213S	PCBs and pesticides detected here	A few pesticides detected; PCBs now ND; Mn above Performance Standard
MW-214S	The highest site PCB concentrations were detected here, along with exceedances of Performance Standards by pesticides, Mn, and As	Pesticides/PCBs now ND; As and Mn still above Performance Standards
MW-215B	BEHP detected above the Performance Standard	BEHP now ND
Existing Barcad Well – "MW" Series		
MW-01	Check the most downgradient wells	(no historical results) – Two PAHs detected at 0.012 µg/L, no Performance Standard exceedances
MW-01A	Check the most downgradient wells; sample one deep overburden well for 1,4-dioxane	No Performance Standard exceedances; 1,4-dioxane was ND
MW-01B	Check the most downgradient wells	(no historical results); similar to MW-01; two PAHs detected; no Performance Standard exceedances;
MW-01C	Check the most downgradient wells; sample the shallow overburden well for 1,4-dioxane	No organics detected (including 1,4-dioxane); no Performance Standard exceedances
Wells Installed Winter 2005-2006		
MW-301S	Check the surficial aquifer in the Oil/Sludge Recycling Area for PCBs/pesticides; 1,1,1-TCA detected in the historical MW-201S location	MTBE detected (3.4 µg/L); As and Mn above Performance Standards; 1,4-dioxane was ND
MW-301D	1,1,1-TCA detected in the historical MW-201S location	MTBE detected (0.21 µg/L); toluene detected (0.13 µg/L)
MW-301B	Replace destroyed wells upgradient of the Oil/Sludge Recycling Area	Toluene detected at 0.2 µg/L

TABLE E-1. NOTABLE DETECTIONS AND OBSERVATIONS OF WINTER 2005-2006 GROUNDWATER MONITORING ROUND

Well ID	Original Selection Rationale (based on historical monitoring data)	Notable Detections and Observations of Winter 2005-2006 Monitoring Round
MW-302S	Check the surficial aquifer in the area downgradient of the Oil/Sludge Recycling Area; screen at the water table to look for LNAPL	No organics detected; no notable metal detections
MW-303S	LNAPL was historically found in destroyed piezometer P-12. Check the surficial aquifer in this area and screen at the water table to look for LNAPL; likely location for LNAPL sample	Carbon tetrachloride detected (0.39 μg/L); As and Mn above Performance Standards; LNAPL not detected
MW-304S	Fill a data gap at the Contaminated Soils Area	PCE detected (0.085 μg/L); delta-BHC detected (0.0054 μg/L)
MW-304D	Fill a data gap at the Contaminated Soils Area; sample for 1,4-dioxane in the deep overburden flow zone	Bromochloromethane, PCE, and toluene detected (0.057, 0.34, and 0.46 μg/L, respectively); 1,4-dioxane was ND
MW-304B	Fill a data gap at the Contaminated Soils Area	1,1-DCA (0.47 μg/L) and bromochloromethane (0.27 μg/L) detected; bis(2-chloroethyl)ether, butylbenzylphthalate, and naphthalene detected at less than 0.2 μg/L
MW-305S	Fill a data gap upgradient of the Asbestos Landfill; 1,1,1-TCA was previously detected in MW-207B	Miscellaneous VOCs and SVOCs detected – all less than 2 μg/L; 4,4'-DDT and dieldrin detected; Mn above Performance Standard; 1,4-dioxane was ND
MW-305D	Fill a data gap upgradient of the Asbestos Landfill; 1,1,1-TCA was previously detected in MW-207B	Miscellaneous VOCs and SVOCs detected – all less than 5 μg/L; 1,4-dioxane at 1.7 μg/L; 1,2-DCA close to Performance Standard (4.8 μg/L)
MW-306S	Fill a data gap upgradient of the Asbestos Landfill	Miscellaneous VOCs and SVOCs detected, including phenols, phthalates, and PAHs – none above 1 μg/L
MW-307S	Fill a data gap at the Asbestos Landfill	Benzene detected above Performance Standard (6.6 μg/L); many VOCs detected, including vinyl chloride (0.66 μg/L); miscellaneous SVOCs detected – all below 1.5 μg/L; Mn above Performance Standard
MW-307D	Fill a data gap at the Asbestos Landfill	Many VOCs detected; 1,2-DCA above Performance Standard (11 μg/L)
MW-307B	Fill a data gap at the Asbestos Landfill	Many VOCs detected; 1,2-DCA above Performance Standard (23 μg/L); As above Performance Standard
MW-308B	Check the bedrock aquifer below the Asbestos Landfill	Many VOCs detected; 1,2-DCA above Performance Standard (8.5 μg/L); TCE well above Performance Standard (75 μg/L); vinyl chloride detected (0.74 μg/L); 1,4-dioxane detected (2 μg/L)
Existing Piezometers – "PZ" Series		
PZ-115	Sample LNAPL	LNAPL determined to be No. 6 Fuel Oil

Notes

1,1,1-TCA – 1,1,1-Trichloroethane
1,2-DCA – 1,2-Dichloroethane
BEHP – Bis(2-ethylhexyl)phthalate
MCL – Maximum Contaminant Limit
ND – Non-detect
PCBs – Polychlorinated Biphenyls
TCE – Trichloroethene
SVOCs – Semivolatile Organic Compounds
1,1-DCE – 1,1-Dichloroethene
As – Arsenic
LNAPL – Light non-aqueous phase liquid
Mn – Manganese
PAHs – Polynuclear Aromatic Hydrocarbons
PCE – Tetrachloroethene
Tl – Thallium
VOCs – Volatile Organic Compounds

TABLE E-2
GROUNDWATER DETECTIONS - SITE-WIDE (OVERBURDEN AND BEDROCK COMBINED)
IRON HORSE PARK SUPERFUND SITE - OU4

Chemical	Minimum Detected Concentration (ug/l)	Maximum Detected Concentration (ug/l)	Location of Maximum Detected Concentration	Detection Frequency	Range of Detection Limits (ug/l)
1,1,1-Trichloroethane	0.072 J	22	OW-08	8 / 60	0.5
1,1,2,2-Tetrachloroethane	0.077 J	0.077 J	MW-202S	1 / 60	0.5
1,1-Dichloroethane	0.063 J	38	OW-08	27 / 60	0.5
1,1-Dichloroethene	0.26 J	4.8 J	OW-20	5 / 60	0.5 - 0.57
1,2,3-Trichlorobenzene	0.23 J	0.23 J	MW-306S	1 / 60	0.5
1,2-Dichlorobenzene	0.27 J	1.5	OW-10	11 / 60	0.5 - 0.62
1,2-Dichloroethane	0.095 J	23	MW-307B	17 / 60	0.5 - 2.7
1,2-Dichloropropane	0.21 J	0.81	OW-25	4 / 60	0.5
1,3-Dichlorobenzene	0.16 J	0.16 J	MW-202S	1 / 60	0.5
1,4-Dichlorobenzene	0.14 J	7.5	MW-202S	13 / 60	0.5
Acetone	5.4	5.4	MW-307S	1 / 60	5
Benzene	0.20 J	59	OW-08	8 / 60	0.5
Bromochloromethane	0.057 J	1.4	MW-308B	5 / 60	0.5
Carbon Tetrachloride	0.10 J	120	MW-202S	12 / 60	0.5
Chlorobenzene	0.16 J	46	OW-08	10 / 60	0.5
Chloroethane	2.5	7.2	MW-308B	3 / 60	0.5 - 1.5
Chloromethane	0.11 J	7.1	MW-308B	10 / 60	0.5
cis-1,2-Dichloroethene	0.24 J	2.4	OW-49	9 / 60	0.5
cis-1,3-Dichloropropene	1.2 J	8.6	OW-08	2 / 60	0.5
Cyclohexane	0.19 J	0.35 J	MW-211D	2 / 60	0.5
Dichlorodifluoromethane	0.23 J	3.5 J	MW-307S	3 / 60	0.5
Ethylbenzene	0.10 J	1.1 J	MW-307S	5 / 60	0.5
Isopropylbenzene	0.34 J	0.34 J	OW-12	1 / 60	0.5
Methyl acetate	1.8 J	1.8 J	MW-203D	1 / 60	0.5
Methyl tert-butyl ether	0.089 J	3.4	MW-301S	21 / 60	0.5
Methylcyclohexane	0.16 J	1.7 J	MW-307S	5 / 60	0.5
Methylene Chloride	0.065 J	0.065 J	MW-203S	1 / 60	0.5
Tetrachloroethene	0.085 J	39	OW-20	13 / 60	0.5
Toluene	0.058 J	0.52	OW-08	9 / 60	0.5
trans-1,2-Dichloroethene	0.076 J	2.1	MW-308B	8 / 60	0.5
Trichloroethene	0.080 J	75	MW-308B	19 / 60	0.5
Trichlorofluoromethane	0.11 J	0.71	MW-207B	2 / 60	0.5
Vinyl Chloride	0.66	0.74	MW-308B	2 / 60	0.5
Xylene (total)	0.29 J	250 J	MW-307S	4 / 60	0.5
1,4-Dioxane	0.59 J	2.9	MW-203D	6 / 15	2
2,4-Dimethylphenol	0.52 J	1.1 J	MW-307S	2 / 60	5 - 5.7
2,4-Dinitrotoluene	6.7	6.7	OW-37	1 / 60	5 - 5.7
2,6-Dinitrotoluene	1.3 J	1.3 J	OW-37	1 / 60	5 - 5.7
2-Methylnaphthalene	0.077 J	1.2	OW-12	3 / 60	0.2 - 5.8
2-Methylphenol	0.48 J	0.48 J	MW-306S	1 / 60	5 - 5.7
3-Nitroaniline	6.2 J	6.2 J	OW-37	1 / 60	20 - 23
4,6-Dinitro-2-methylphenol	0.11 J	0.11 J	MW-203S	1 / 60	20 - 23
4-Methylphenol	0.97 J	0.97 J	MW-306S	1 / 60	5 - 5.7
Acenaphthene	0.033 J	1.0	MW-214S	9 / 60	0.2 - 0.33
Acenaphthylene	0.012 J	0.015 J	MW-214S	2 / 60	0.2 - 5
Anthracene	0.49 J	0.74 J	MW-213S	2 / 60	5 - 5.7
Atrazine	0.13 J	1.9 J	MW-202D	7 / 36	1 - 5
Benzaldehyde	1.8 J	2.0 J	OW-37	2 / 60	5 - 5.7
Benzo(g,h,i)perylene	0.024 J	0.097 J	OW-25	7 / 60	0.2 - 5
Bis(2-chloroethyl)ether	0.020 J	0.70	MW-307D	19 / 59	0.05 - 0.82
Bis(2-ethylhexyl)phthalate	1.9 J	1.9 J	MW-212D	1 / 60	0.2 - 5
Butylbenzylphthalate	0.19 J	0.71 J	MW-305D	3 / 60	5 - 5.7
Dibenz(a,h)anthracene	0.019 J	0.050 J	MW-208D and MW-208S	6 / 60	0.1 - 5
Dibenzofuran	0.90 J	0.90 J	MW-213S	1 / 60	5 - 5.7
Dimethylphthalate	0.015 J	0.54 J	MW-306S	2 / 60	5 - 5.7
Di-n-octylphthalate	0.58 J	0.58 J	MW-306S	1 / 60	5 - 5.7
Fluoranthene	0.13 J	0.98 J	MW-214S	3 / 60	5 - 5.7
Fluorene	0.46 J	1.8 J	MW-214S	4 / 60	5 - 5.7
Indeno(1,2,3-cd)pyrene	0.021 J	0.057 J	MW-208S	6 / 60	0.1 - 5
Isophorone	0.77 J	0.77 J	OW-37	1 / 60	5 - 5.7
Naphthalene	0.028 J	1.1	OW-12	5 / 59	0.2 - 0.33
N-Nitrosodiphenylamine	0.40 J	0.40 J	MW-213S	1 / 60	5 - 5.7
Phenanthrene	0.011 J	2.1	MW-214S	12 / 60	0.2 - 0.33

TABLE E-2
GROUNDWATER DETECTIONS - SITE-WIDE (OVERBURDEN AND BEDROCK COMBINED)
IRON HORSE PARK SUPERFUND SITE - OU4

Chemical	Minimum Detected Concentration (ug/l)	Maximum Detected Concentration (ug/l)	Location of Maximum Detected Concentration	Detection Frequency	Range of Detection Limits (ug/l)
Phenol	5.7	5.7	OW-08	1 / 60	5 - 5.7
Pyrene	0.039 J	0.46	MW-214S	5 / 60	0.2 - 0.33
4,4'-DDT	0.0066 J	0.013 J	MW-213S	2 / 21	0.01
alpha-Chlordane	0.0051 J	0.0051 J	OW-09	1 / 20	0.005
delta-BHC	0.0054	0.0054	MW-304S	1 / 20	0.005
Dieldrin	0.013	0.013	MW-305S	1 / 20	0.01
Endosulfan II	0.016 J	0.016 J	MW-213S	1 / 21	0.01
Endrin Ketone	0.020 J	0.020 J	MW-213S	1 / 21	0.01
Aluminum	11 J	7070	MW-301D	42 / 60	50
Antimony	2.6 J	4.2 J	MW-304S	4 / 60	2 - 20
Arsenic	0.054 J	281	MW-211D	58 / 60	0.5
Barium	2.6 J	837	MW-213S	60 / 60	N/A
Beryllium	0.10 J	3.1 J	OW-09	8 / 60	1 - 10
Cadmium	0.051 J	22	MW-01B	35 / 60	1
Calcium	3120 J	1775000	MW-207B	60 / 60	N/A
Chromium	0.083 J	32	MW-301D	35 / 60	2 - 20
Cobalt	0.23 J	341	OW-09	43 / 60	1 - 10
Copper	0.52 J	135 J	OW-09	15 / 60	2 - 20
Iron	31 J	57400	MW-214S	44 / 60	100 - 226
Lead	0.11 J	29	MW-01	37 / 60	1 - 10
Magnesium	1040 J	196000	MW-207B	58 / 60	5000
Manganese	6.6	22600	OW-09	60 / 60	N/A
Mercury (inorganic)	0.083 J	0.90 J	MW-207B	2 / 60	0.2
Nickel	0.35 J	286 J	OW-09	41 / 60	1 - 10
Potassium	878 J	47300	OW-25	60 / 60	N/A
Selenium	0.15 J	2.7 J	MW-213S	5 / 60	5 - 50
Silver	0.63 J	23	MW-207B	2 / 60	1 - 10
Sodium	4900 J	4070000	OW-25	60 / 60	N/A
Vanadium	0.046 J	16	MW-301D	48 / 60	0.19 - 1
Zinc	1.2 J	357 J	OW-09	26 / 60	2 - 45.9

Samples collected in December 2005 and February 2006.

Samples include: MW-01, MW-01A, MW-01B, MW-01C, MW-202B, MW-202D, MW-202S, MW-203B, MW-203D, MW-203S, MW-204S, MW-205S, MW-206D, MW-206S, MW-207B (plus duplicate), MW-208B, MW-208D, MW-208S, MW-209B, MW-210S, MW-211D, MW-211S, MW-212B, MW-212D (plus duplicate), MW-213B, MW-213D, MW-213S (plus duplicate), MW-214S, MW-215B, MW-301B, MW-301D, MW-301S, MW-302S, MW-303S, MW-304B, MW-304D (plus duplicate), MW-304S, MW-305D, MW-305S, MW-306S, MW-307B, MW-307D, MW-307S, MW-308B, OW-01, OW-02, OW-07, OW-08, OW-09, OW-10, OW-12, OW-20, OW-25, OW-26, OW-35, OW-37, OW-38, OW-49, OW-50, and OW-51

(1) Minimum/maximum detected concentration.

N/A = Not Applicable or Not Available

J = Estimated Value

TABLE E-3. NOTABLE DETECTIONS AND OBSERVATIONS OF WINTER 2005-2006 GROUNDWATER MONITORING ROUND

Well ID	Original Selection Rationale (based on historical monitoring data)	Notable Detections and Observations of Winter 2005-2006 Monitoring Round
RSI Landfill		
MW-207B	Location upgradient of Asbestos Landfill; historical detections of 1,1,1-TCA and 1,2-DCA	• Miscellaneous VOCs detected • TCE and PCE above PRGs; • 1,1,1-TCA detected at 2.3 ug/L, which is just below the historical detection of 3 ug/L; • 1,2-DCA detected at 2.6 ug/L which is less than half of historical results; • Mn above PRG • 1,4-dioxane at 1.3 ug/L
MW-210S	Metal concentrations higher than most other site locations	• Similar to historical results • As and Mn above PRGs
MW-211D	Metal concentrations higher than most other site locations	• Similar to historical results • As and Mn above PRGs
MW-211S	Pesticides, Mn, and As concentrations higher than most other site locations	• No organics detected • As and Mn reduced in magnitude compared to historical results
MW-212B	Mn detected above the PRG	• As and Mn above PRGs
MW-212D	1,1,2,2-Tetrachloroethane and manganese detected above the PRGs	• 1,1,2,2-Tetrachloroethane now ND • As and Mn above PRGs
OW-01	TCE detected at the MCL/PRG (5 ug/L)	• TCE now below PRG (1.5 ug/L) • Detections of 1,1-DCA (1.4 ug/L) and 1,2-DCA (0.74 ug/L) – Below PRG
OW-02	Mn detected above the PRG	• Mn detected at the same magnitude; • As above PRG
OW-25	Tl and Mn detected above the PRGs	• Miscelleanous VOCs detected • TCE and PCE just below PRGs (3.2 and 4.4 ug/L, respectively) • Mn above PRG; • Tl was ND, but the DL was elevated (5 ug/L) above the PRG of 2 ug/L
OW-26	Pesticides detected	• Pesticides now ND • As above PRG

B&M Locomotive Shop Disposal Areas (A&B)		
MW-204S	1,1,2,2-Tetrachloroethane and Mn detected above the PRGs	• Acenaphthene only organic detected; • Mn detected well above the PRG (22400 ug/L)
MW-205S	Check the surficial aquifer in the Locomotive Shop Disposal Areas	• Acenaphthene and phenanthrene only organics detected • Mn above PRG
MW-206D	Check the deep aquifer in the Locomotive Shop Disposal Areas	• 1,2-Dichloropropane and MTBE only organics detected • No PRG exceedances
MW-206S	Check the surficial aquifer in the Locomotive Shop Disposal Areas	• MTBE only organic detected • Mn above PRG

TABLE E-3. NOTABLE DETECTIONS AND OBSERVATIONS OF WINTER 2005-2006 GROUNDWATER MONITORING ROUND

Well ID	Original Selection Rationale (based on historical monitoring data)	Notable Detections and Observations of Winter 2005-2006 Monitoring Round
Contaminated Soils Area (CSA)		
OW-20	Pesticides detected and Mn detected above the PRG	• Miscelleanous VOCs detected • TCE and PCE above PRGs (7 and 39 ug/L, respectively) • Pesticides now ND • As and Mn above PRGs
OW-35	Pesticides near the Contaminated Soils Area detected here	• No organics detected • Mn at 327 ug/L – previously 306 ug/L (similar to historical)
OW-37	Mn detected above the PRG	• Miscellaneous organics detected • Mn similar to historical results
OW-38	A downgradient location from the Oil/Sludge Recycling Area (which had detections of 1,1,1-TCA); Mn detected above the PRG	• 1,4-Dioxane was ND • VOC detections were higher than most other locations • PCE above PRG (14 ug/L) • Carbon tetrachloride at 37 ug/L • Mn similar to historical results
MW-208B	BEHP detected above the PRG	• BEHP now below PRG • Mn now below PRG
MW-208D	BEHP detected above the PRG	• BEHP now below PRG • Mn above PRG
MW-208S	As and Mn detected above the PRGs	• As and Mn detected at magnitudes similar to historical results
MW-209B	1,2-DCA and Mn detected above PRGs	• Both 1,2-DCA and Mn still above PRGs, with 1,2-DCA approximately half of historical results
MW-304S	Fill a data gap at the Contaminated Soils Area	• PCE detected (0.085 ug/L) • delta-BHC detected (0.0054 ug/L)
MW-304D	Fill a data gap at the Contaminated Soils Area; sample for 1,4-dioxane in the deep overburden flow zone	• Bromochloromethane, PCE, and toluene detected (0.057, 0.34, and 0.46 ug/L, respectively) • 1,4-dioxane was ND
MW-304B	Fill a data gap at the Contaminated Soils Area	• 1,1-DCA (0.47 ug/L) and bromochloromethane (0.27 ug/L) detected • bis(2-chloroethyl)ether, butylbenzylphthalate, and naphthalene detected at less than 0.2 ug/L

TABLE E-3. NOTABLE DETECTIONS AND OBSERVATIONS OF WINTER 2005-2006 GROUNDWATER MONITORING ROUND

Well ID	Original Selection Rationale (based on historical monitoring data)	Notable Detections and Observations of Winter 2005-2006 Monitoring Round
Asbestos Landfill		
MW-207B	Location upgradient of Asbestos Landfill; historical detections of 1,1,1-TCA and 1,2-DCA	• Miscellaneous VOCs detected • TCE and PCE above PRGs; • 1,1,1-TCA detected at 2.3 ug/L, which is just below the historical detection of 3 ug/L; • 1,2-DCA detected at 2.6 ug/L which is less than half of historical results; • Mn above PRG • 1,4-dioxane at 1.3 ug/L
MW-305S	Fill a data gap upgradient of the Asbestos Landfill; 1,1,1-TCA was previously detected in MW-207B	• Miscellaneous VOCs and SVOCs detected – all less than 2 ug/L • 4,4'-DDT and dieldrin detected • Mn above PRG • 1,4-dioxane was ND
MW-305D	Fill a data gap upgradient of the Asbestos Landfill; 1,1,1-TCA was previously detected in MW-207B	• Miscellaneous VOCs and SVOCs detected – all less than 5 ug/L • 1,4-dioxane at 1.7 ug/L • 1,2-DCA close to PRG (4.8 ug/L)
MW-306S	Fill a data gap upgradient of the Asbestos Landfill	• Miscellaneous VOCs and SVOCs detected, including phenols, phthalates, and PAHs – none above 1 ug/L
MW-307S	Fill a data gap at the Asbestos Landfill	• Benzene detected above PRG (6.6 ug/L) • Many VOCs detected, including vinyl chloride (0.66 ug/L) • Miscellaneous SVOCs detected – all below 1.5 ug/L • Mn above PRG
MW-307D	Fill a data gap at the Asbestos Landfill	• Many VOCs detected • 1,2-DCA above PRG (11 ug/L)
MW-307B	Fill a data gap at the Asbestos Landfill	• Many VOCs detected • 1,2-DCA above PRG (23 ug/L) • As above PRG
MW-308B	Check the bedrock aquifer below the Asbestos Landfill	• Many VOCs detected • 1,2-DCA above PRG (8.5 ug/L) • TCE well above PRG (75 ug/L) • Vinyl chloride detected (0.74 ug/L) • 1,4-dioxane detected (2 ug/L)
OW-07	The second highest PCB concentration detected, as well as TCE above the PRG	• PCBs now non-detect (ND) • TCE reduced from 21 ug/L to 4.6 ug/L • 1,1-DCA (0.34 ug/L); chloromethane (1.6 ug/L); and trans-1,2-DCE (0.58 ug/L) • Mn detected above PRG at similar magnitude to historical results
OW-08	Benzene detected, as well as pesticides	• Benzene still detected above PRG, but at 59 ug/L rather than above 300 ug/L • 1,1,1-TCA, 1,1-DCA, and chlorobenzene were previously not detected and are now present at 22, 38, and 46 ug/L, respectively • Other miscellaneous VOCs, including BTEX compounds, detected at low concentrations • Phenol was the only SVOC detected (5.7 ug/L) • Pesticides were ND • Metals detected at similar magnitude to historical results (Mn and As above PRG)

TABLE E-3. NOTABLE DETECTIONS AND OBSERVATIONS OF WINTER 2005-2006 GROUNDWATER MONITORING ROUND

Well ID	Original Selection Rationale (based on historical monitoring data)	Notable Detections and Observations of Winter 2005-2006 Monitoring Round
OW-25	Tl and Mn detected above the PRGs	• Miscelleanous VOCs detected • TCE and PCE just below PRGs (3.2 and 4.4 ug/L, respectively) • Mn above PRG; • Tl was ND, but the DL was elevated (5 ug/L) above the PRG of 2 ug/L
OW-26	Pesticides detected	• Pesticides now ND • As above PRG

B&M Railroad Landfill		
MW-01	Check the most downgradient wells	• Two PAHs detected at 0.012 ug/L, no PRG exceedances • No historical results
MW-01A	Check the most downgradient wells; sample one deep overburden well for 1,4-dioxane	• No PRG exceedances; • 1,4-dioxane was ND
MW-01B	Check the most downgradient wells	• Two PAHs detected; no PRG exceedances • No historical results - Similar to MW-01
MW-01C	Check the most downgradient wells; sample the shallow overburden well for 1,4-dioxane	• No organics detected (including 1,4-dioxane) • No PRG exceedances
MW-213B	Multiple chlorinated VOCs detected above PRGs	• 1,1-DCE and 1,2-DCA now below PRGs • TCE still above PRG (16 ug/L), but trending downwards • Metals below PRGs
MW-213D	Chlorinated VOCs and Mn detected above PRGs	• 1,1-DCE now ND • TCE now below PRG (4.8 ug/L) – down significantly • Mn now below PRG
MW-213S	PCBs and pesticides detected here	• A few pesticides detected • PCBs now ND • Mn above PRG
MW-214S	The highest site PCB concentrations were detected here, along with exceedances of PRGs by pesticides, Mn, and As	• Pesticides/PCBs now ND • As and Mn still above PRGs
MW-215B	BEHP detected above the PRG	• BEHP now ND
OW-35	Pesticides near the Contaminated Soils Area detected here	• No organics detected • Mn at 327 ug/L – previously 306 ug/L (similar to historical)
OW-49	Close to off-site; downgradient of B&M Railroad Landfill	• 1,2-DCA at PRG (5 ug/L; was previously above PRG) • TCE still above PRG (7.8 ug/L), but a lot lower than historical values (22-25 ug/L) • Mn still above PRG (516 ug/L), but now half of historical results
OW-50	Close to off-site; downgradient of B&M Railroad Landfill; check for 1,4-dioxane in a downgradient location	• 1,4-Dioxane detected (0.59 ug/L) below state MCL • Mn still moderate (1350 ug/L)
OW-51	Close to off-site; downgradient of B&M Railroad Landfill	• As and Mn above PRGs • No historical results
PZ-115	Sample LNAPL	• LNAPL determined to be No. 6 Fuel Oil

TABLE E-3. NOTABLE DETECTIONS AND OBSERVATIONS OF WINTER 2005-2006 GROUNDWATER MONITORING ROUND

Well ID	Original Selection Rationale (based on historical monitoring data)	Notable Detections and Observations of Winter 2005-2006 Monitoring Round
Old B&M Oil/Sludge Recycling Area		
MW-202B	Check to see if contaminants migrated out of Oil/Sludge Recycling Area	• No notable detections
MW-202D	Check to see if contaminants migrated out of Oil/Sludge Recycling Area	• No notable detections
MW-202S	Check to see if contaminants migrated out of Oil/Sludge Recycling Area; check surficial aquifer for pesticide detections	• High detection of carbon tetrachloride (120 ug/L) • Miscellaneous VOCs and SVOCs detected • Pesticides were ND • As above PRG
MW-203B	Check to see if contaminants migrated out of Oil/Sludge Recycling Area	• No notable detections
MW-203D	1,1,1-TCA detected	• 1,1,1-TCA still detected, but lower (0.16 ug/L); • No PRG exceedances • 1,4-dioxane at 2.9 ug/L
MW-203S	1,1,1-TCA detected in MW-203D; check surficial aquifer in the area downgradient of the Oil/Sludge Recycling Area	• Mn above PRG • 1,4-dioxane was ND
MW-301S	Check the surficial aquifer in the Oil/Sludge Recycling Area for PCBs/pesticides; 1,1,1-TCA detected in the historical MW-201S location	• MTBE detected (3.4 ug/L) • As and Mn above PRGs • 1,4-dioxane was ND
MW-301D	1,1,1-TCA detected in the historical MW-201S location	• MTBE detected (0.21 ug/L) • Toluene detected (0.13 ug/L)
MW-301B	Replace destroyed wells upgradient of the Oil/Sludge Recycling Area	• Toluene detected at 0.2 ug/L
MW-302S	Check the surficial aquifer in the area downgradient of the Oil/Sludge Recycling Area; screen at the water table to look for LNAPL	• No organics detected • No notable metal detections
MW-303S	LNAPL was historically found in destroyed piezometer P-12. Check the surficial aquifer in this area and screen at the water table to look for LNAPL; likely location for LNAPL sample	• Carbon tetrachloride detected (0.39 ug/L) • As and Mn above PRGs • LNAPL not detected
OW-37	Mn detected above the PRG	• Miscellaneous organics detected • Mn similar to historical results
OW-38	A downgradient location from the Oil/Sludge Recycling Area (which had detections of 1,1,1-TCA); Mn detected above the PRG	• 1,4-Dioxane was ND • VOC detections were higher than most other locations • PCE above PRG (14 ug/L) • Carbon tetrachloride at 37 ug/L • Mn similar to historical results

TABLE E-3. NOTABLE DETECTIONS AND OBSERVATIONS OF WINTER 2005-2006 GROUNDWATER MONITORING ROUND

Well ID	Original Selection Rationale (based on historical monitoring data)	Notable Detections and Observations of Winter 2005-2006 Monitoring Round
Asbestos Lagoons		
MW-208B	BEHP detected above the PRG	• BEHP now below PRG • Mn now below PRG
MW-208D	BEHP detected above the PRG	• BEHP now below PRG • Mn above PRG
MW-208S	As and Mn detected above the PRGs	• As and Mn detected at magnitudes similar to historical results
MW-209B	1,2-DCA and Mn detected above PRGs	• Both 1,2-DCA and Mn still above PRGs, with 1,2-DCA approximately half of historical results
OW-09	The highest concentration of PCBs detected here	• VOCs previously detected (1,1-DCA, 1,2-dichlorobenzene, and 1,2-DCA) decreased in concentration; • New VOCs detected all at less than 5 ug/L, with most below 1 ug/L • One pesticide (alpha-chlordane) detected (0.0051 ug/L) • PCBs were ND • High Mn (22600 ug/L)
OW-10	Mn detected above the PRG	• Miscellaneous VOCs and SVOCs detected – none above PRGs • Metals at similar magnitude to historical results
OW-12	1,1,2,2-Tetrachloroethane detected above the PRG	• 1,1,2,2-Tetrachloroethane now ND • Miscellaneous VOCs, including BTEX compounds, detected at low concentrations (< 2 ug/L) • As above PRG • Mn now below PRG •
OW-20	Pesticides detected and Mn detected above the PRG	• Miscelleanous VOCs detected • TCE and PCE above PRGs (7 and 39 ug/L, respectively) • Pesticides now ND • As and Mn above PRGs

Notes
1,1,1-TCA – 1,1,1-Trichloroethane
1,1-DCE – 1,1-Dichloroethene
1,2-DCA – 1,2-Dichloroethane
As – Arsenic
BEHP – Bis(2-ethylhexyl)phthalate
LNAPL – Light non-aqueous phase liquid
MCL – Maximum Contaminant Limit
Mn – Manganese
ND – Non-detect
PAHs – Polynuclear Aromatic Hydrocarbons
PCBs – Polychlorinated Biphenyls
PCE – Tetrachloroethene
PRG – Preliminary Remediation Goal
TCE – Trichloroethene
Tl – Thallium
SVOCs – Semivolatile Organic Compounds
VOCs – Volatile Organic Compounds

ROD RISK WORKSHEET

Table G-1

Summary of Chemical of Concern and Medium-Specific Exposure Point Concentration

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Groundwater

Exposure Point	Chemical of Concern	Concentration Detected Minimum	Concentration Detected Maximum	Units	Frequency of Detection	Exposure Point Concentration	Exposure Point Concentration Units	Statistical Measure (1)
Site-Wide (Overburden and Bedrock Combined)								
	1,2-Dichloroethane	0.095	23	ug/L	17 / 60	23	ug/L	Max
	1,4-Dichlorobenzene	0.14	7.5	ug/L	13 / 60	7.5	ug/L	Max
	Benzene	0.20	59	ug/L	8 / 60	59	ug/L	Max
	Carbon Tetrachloride	0.10	120	ug/L	12 / 60	120	ug/L	Max
	cis-1,3-Dichloropropene	1.2	8.6	ug/L	2 / 60	8.6	ug/L	Max
	Tetrachloroethene	0.085	39	ug/L	13 / 60	39	ug/L	Max
	Trichloroethene	0.080	75	ug/L	19 / 60	75	ug/L	Max
	Vinyl Chloride	0.66	0.74	ug/L	2 / 60	0.74	ug/L	Max
	Atrazine	0.13	1.9	ug/L	7 / 36	1.9	ug/L	Max
	Bis(2-chloroethyl)ether	0.020	0.70	ug/L	19 / 59	0.70	ug/L	Max
	Dibenz(a,h)anthracene	0.019	0.050	ug/L	6 / 60	0.050	ug/L	Max
	Dieldrin	0.013	0.013	ug/L	1 / 20	0.013	ug/L	Max
	Arsenic	0.054	281	ug/L	58 / 60	281	ug/L	Max
	Cadmium	0.051	22	ug/L	35 / 60	22	ug/L	Max
	Manganese	6.6	22600	ug/L	60 / 60	22600	ug/L	Max

Key

(1) Statistics: Maximum Detected Value (Max); 95% UCL (95% UCL); Arithmetic Mean (Mean)

The table represents the future chemicals of concern (COCs) and exposure point concentrations (EPCs) for each of the COCs detected in Site groundwater (i.e., the concentrations that will be used to estimate the exposure and risk for each COC in Site groundwater). The table includes the range of concentrations detected for each COC, as well as the frequency of detection (i.e., the number of times the chemical was detected in the samples collected at the site), the EPC, and how the EPC was derived. This table indicates that the inorganic chemicals, arsenic, cadmium, and manganese, and the organic chemicals, 1,2-dichloroethane, trichloroethene, and bis(2-chloroethyl)ether are the most frequently detected COCs in groundwater at the Site. The maximum detected concentration was used as the EPC for each of the COCs detected in groundwater.

Source: A Guide to Preparing Superfund Proposed Plans, Records of Decision, and Other Remedy Selection Decision Documents (U.S. EPA, 1999)

ROD RISK WORKSHEET

Table G-2

Cancer Toxicity Data Summary

Pathway: Ingestion, Dermal

Chemical of Concern	Oral Cancer Slope Factor	Dermal Cancer Slope Factor	Slope Factor Units	Weight of Evidence/Cancer Guideline Description	Source	Date (MM/DD/YYYY)
1,2-Dichloroethane	9.1E-02	9.1E-02	$(mg/kg\text{-}day)^{-1}$	B2	IRIS	01/31/08
1,4-Dichlorobenzene	5.4E-03	5.4E-03	$(mg/kg\text{-}day)^{-1}$	C	CalEPA	02/15/11
Benzene	5.5E-02	5.5E-02	$(mg/kg\text{-}day)^{-1}$	A	IRIS	01/31/08
Carbon Tetrachloride	1.3E-01	1.3E-01	$(mg/kg\text{-}day)^{-1}$	B2	IRIS	01/31/08
cis-1,3-Dichloropropene	1.0E-01	1.0E-01	$(mg/kg\text{-}day)^{-1}$	B2	IRIS	01/31/08
Tetrachloroethene	5.4E-01	5.4E-01	$(mg/kg\text{-}day)^{-1}$	B2	CalEPA	01/31/08
Trichloroethene	5.9E-03	5.9E-03	$(mg/kg\text{-}day)^{-1}$	C-B2	CalEPA	02/15/11
Vinyl Chloride	7.5E-01	7.5E-01	$(mg/kg\text{-}day)^{-1}$	A	IRIS	01/31/08
Atrazine	2.2E-01	2.2E-01	$(mg/kg\text{-}day)^{-1}$	C	CalEPA	02/15/11
Bis(2-chloroethyl)ether	1.1E+00	1.1E+00	$(mg/kg\text{-}day)^{-1}$	B2	IRIS	01/31/08
Dibenz(a,h)anthracene	7.3E+00	7.3E+00	$(mg/kg\text{-}day)^{-1}$	B2	IRIS	01/31/08
			$(mg/kg\text{-}day)^{-1}$			
Dieldrin	1.6E+01	1.6E+01	$(mg/kg\text{-}day)^{-1}$	B2	IRIS	01/31/08
Arsenic	1.5E+00	1.5E+00	$(mg/kg\text{-}day)^{-1}$	A	IRIS	01/31/08

Pathway: Inhalation

Chemical of Concern	Unit Risk	Units	Inhalation Cancer Slope Factor	Units	Weight of Evidence/Cancer Guideline Description	Source	Date (MM/DD/YYYY)
1,2-Dichloroethane	2.6E-05	$(ug/m^3)^{-1}$	N/A	N/A	B2	IRIS	01/31/08
1,4-Dichlorobenzene	1.1E-05	$(ug/m^3)^{-1}$	N/A	N/A	C	Cal EPA	02/15/11
Benzene	7.8E-06	$(ug/m^3)^{-1}$	N/A	N/A	A	IRIS	01/31/08
Carbon Tetrachloride	1.5E-05	$(ug/m^3)^{-1}$	N/A	N/A	B2	IRIS	01/31/08
cis-1,3-Dichloropropene	4.0E-06	$(ug/m^3)^{-1}$	N/A	N/A	B2	IRIS	01/31/08
Tetrachloroethene	5.9E-06	$(ug/m^3)^{-1}$	N/A	N/A	B2	CalEPA	01/31/08
Trichloroethene	2.0E-06	$(ug/m^3)^{-1}$	N/A	N/A	C-B2	CalEPA	02/15/11
Vinyl Chloride	4.4E-06	$(ug/m^3)^{-1}$	N/A	N/A	A	IRIS	01/31/08
Bis(2-chloroethyl)ether	3.3E-04	$(ug/m^3)^{-1}$	N/A	N/A	B2	IRIS	01/31/08

Key

N/A: Not applicable

IRIS: Integrated Risk Information System, U.S. EPA

CalEPA = California Environmental Protection Agency

EPA Group

A - Human carcinogen

B1 - Probable human carcinogen - Indicates that limited human data are available

B2 - Probable human carcinogen - indicates sufficient evidence in animals and inadequate or no evidence in humans

C - Possible human carcinogen

D - Not classifiable as a human carcinogen

E - Evidence of noncarcinogenicity

This table provides the carcinogenic risk information which is relevant to the contaminants of concern in groundwater. At this time, slope factors are not available for the dermal route of exposure. Thus, the dermal slope factors used in this assessment have been extrapolated from oral values. An adjustment factor is sometimes applied, and is dependent upon how well the chemical is absorbed via the oral route. Adjustments are particularly important for chemicals with less than 50% absorption via the ingestion route. However, adjustment is not necessary for the chemicals evaluated at this site. Therefore, the same values presented above were used as the dermal carcinogenic slope factors for these contaminants. Nine of the COCs are also considered carcinogenic via the inhalation route. Atrazine, dibenz(a,h)anthracene, dieldrin, and arsenic, as non-volatile contaminants, were not included in the evaluation of inhalation exposures. Toxicity data for trichloroethene, 1,4-dichlorobenzene, and atrazine have been updated since the Supplemental HHRA. Please refer to McDonough, 2011 for further information on these changes.

Source: A Guide to Preparing Superfund Proposed Plans, Records of Decision, and Other Remedy Selection Decision Documents (U.S. EPA, 1999)

ROD RISK WORKSHEET

Table G-3

Non-Cancer Toxicity Data Summary

Pathway: Ingestion, Dermal

Chemical of Concern	Chronic/ Subchronic	Oral RfD Value	Oral RfD Units	Dermal RfD	Dermal RfD Units	Primary Target Organ	Combined Uncertainty / Modifying Factors	Sources of RfD: Target Organ	Dates of Rfd: Target Organ (MM/DD/YYYY)
Benzene	Chronic	4.0E-03	mg/kg-day	4.0E-03	mg/kg-day	Immune System	300	IRIS	01/31/08
Carbon Tetrachloride	Chronic	7.0E-04	mg/kg-day	7.0E-04	mg/kg-day	Liver	1000	IRIS	01/31/08
Arsenic	Chronic	3.0E-04	mg/kg-day	3.0E-04	mg/kg-day	Skin	3	IRIS	01/31/08
Cadmium	Chronic	5.0E-04	mg/kg-day	2.5E-05	mg/kg-day	Kidney	10	IRIS	01/31/08
Manganese (water)	Chronic	2.4E-02	mg/kg-day	9.6E-04	mg/kg-day	CNS	9	IRIS	01/31/08

Pathway: Inhalation

Chemical of Concern	Chronic/ Subchronic	Inhalation RfC	Inhalation RfC Units	Inhalation RfD	Inhalation RfD Units	Primary Target Organ	Combined Uncertainty / Modifying Factors	Sources of RfC: RfD: Target Organ	Dates (MM/DD/YYYY)
Benzene	Chronic	30	ug/m^3	N/A	N/A	Immune System	300	IRIS	01/31/08
Carbon Tetrachloride	Chronic	40	ug/m^3	N/A	N/A	GI System/ Developmental/CNS	N/A	CalEPA	01/31/08

Key

N/A - No information available

IRIS - Integrated Risk Information System, U.S. EPA

CalEPA = California Environmental Protection Agency. REL = Reference Exposure Level.

This table provides non-carcinogenic risk information which is relevant to the contaminants of concern in groundwater. Five of the COCs have oral toxicity data indicating their potential for adverse non-carcinogenic health effects in humans. Chronic toxicity data available for the 5 COCs for oral exposures have been used to develop chronic oral reference doses (RfDs), provided in this table. The available chronic toxicty data indicate that benzene affects the immune system, carbon tetrachloride affects the liver, cadmium affects the kidney, manganese, and carbon tetrachloride affect the central nervous system, carbon tetrachloride is a developmental toxicant and affects the gastrointestinal system, and arsenic affects the skin. Dermal RfDs are not available for any of the COCs. As was the case for the carcinogenic data, dermal RfDs can be extrapolated from oral RfDs by applying an adjustment factor as appropriate. Oral RfDs were adjusted for COCs with less than 50% absorption via the ingestion route (cadmium and manganese) to derive dermal RfDs for these COCs. Inhalation reference concentrations (RfCs) are available for 2 volatile COCs evaluated for the inhalation pathway. Arsenic, cadmium, and manganese as non-volatile contaminants, were not included in the evaluation of inhalation exposures. Toxicity data for trichloroethene have been updated since the Supplemental HHRA. Please refer to McDonough, 2011 for further information on this change.

Source: A Guide to Preparing Superfund Proposed Plans, Records of Decision, and Other Remedy Selection Decision Documents (U.S. EPA, 1999)

ROD RISK WORKSHEET

Table G-4								
Risk Characterization Summary - Carcinogens								
Scenario Timeframe: Future **Receptor Population: Resident** **Receptor Age: Young Child/Adult**								
Medium	**Exposure Medium**	**Exposure Point**	**Chemical of Concern**	**Carcinogenic Risk**				
				Ingestion	**Inhalation**	**Dermal**	**External (Radiation)**	**Exposure Routes Total**
Groundwater	Groundwater	Site-Wide (Overburden and Bedrock Combined)						
			1,2-Dichloroethane	4E-05	2E-05	2E-06	- -	6E-05
			1,4-Dichlorobenzene	7E-07	1E-07	5E-07	- -	1E-06
			Benzene	6E-05	2E-05	7E-06	- -	8E-05
			Carbon Tetrachloride	3E-04	6E-05	6E-05	- -	4E-04
			cis-1,3-Dichloropropene	2E-05	1E-06	1E-06	- -	2E-05
			Tetrachloroethene	4E-04	8E-06	2E-04	- -	6E-04
			Trichloroethene	7E-06	5E-06	1E-06	- -	1E-05
			Vinyl Chloride	7E-05	7E-07	2E-06	- -	7E-05
			Atrazine	7E-06	- -	8E-07	- -	8E-06
			Bis(2-chloroethyl)ether	1E-05	7E-07	3E-07	- -	1E-05
			Dibenz(a,h)anthracene	6E-06	- -	N/A	- -	6E-06
			Dieldrin	4E-06	- -	2E-06	- -	6E-06
			Arsenic	7E-03	- -	4E-05	- -	7E-03
							Groundwater Risk Total =	9E-03
							Total Risk =	9E-03

Key

-- Route of exposure is not applicable to this medium.

N/A - Toxicity criteria are not available to quantitatively address this route of exposure.

-- Route of exposure is not applicable to this medium.

This table provides risk estimates for the significant routes of exposure for the future child and adult resident exposed to groundwater used as household water should groundwater COCs migrate from the Site. These risk estimates are based on a reasonable maximum exposure and were developed by taking into account various conservative assumptions about the frequency and duration of a child's and adult's exposure to groundwater, as well as the toxicity of the COCs (1,2-dichloroethane, 1,4-dichlorobenzene, benzene, carbon tetrachloride, cis-1,3-dichloropropene, tetrachloroethene, trichloroethene, vinyl chloride, atrazine, bis(2-chloroethyl)ether, dibenz(a,h)anthracene, dieldrin, and arsenic). The total risk from direct exposure to contaminated groundwater at this site to a future resident, in the event that groundwater migrates from the Site, is estimated to be 1 x 10^{-2}. The COCs contributing most to this risk level are carbon tetrachloride, tetrachloroethene, trichloroethene, and arsenic in groundwater. This risk level indicates that if no clean-up action is taken, an individual would have an increased probability of 1 in 100 of developing cancer as a result of site-related exposure to the COCs in groundwater.

Source: A Guide to Preparing Superfund Proposed Plans, Records of Decision, and Other Remedy Selection Decision Documents (U.S. EPA, 1999)

ROD RISK WORKSHEET

Table G-5

Risk Characterization Summary - Non-Carcinogens

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Young Child/Adult

Medium	Exposure Medium	Exposure Point	Chemical of Concern	Primary Target Organ	Non-Carcinogenic Hazard Quotient			
					Ingestion	Inhalation	Dermal	Exposure Routes Total
Groundwater	Groundwater	Site-Wide (Overburden and Bedrock Combined)						
			Benzene	Immune System	1E+00	3E-01	1E-01	2E+00
			Carbon Tetrachloride	Liver	2E+01	4E-01	3E+00	2E+01
			Arsenic	Skin	9E+01	--	4E-01	9E+01
			Cadmium	Kidney	4E+00	--	4E-01	5E+00
			Manganese	CNS	9E+01	--	1E+01	1E+02
							Groundwater Hazard Index Total =	2E+02
							General Toxicity Hazard Index =	N/A
							Developmental Hazard Index =	N/A
							Gastrointestinal System Hazard Index =	N/A
							Immune System Hazard Index =	2E+00
							Liver Hazard Index =	2E+01
							Kidney Hazard Index =	5E+00
							Blood Hazard Index =	N/A
							Skin Hazard Index =	9E+01
							CNS Hazard Index =	1E+02

Key

N/A - Toxicity criteria are not available to quantitatively address this route of exposure.

-- Route of exposure is not applicable to this medium.

This table provides hazard quotients (HQs) for each route of exposure and the hazard index (sum of the hazard quotients) for all routes of exposure for the future resident exposed to groundwater used as household water should groundwater COCs migrate from the Site. The Risk Assessment Guidance (RAGS) for Superfund states that, generally, a hazard index (HI) of greater than 1 indicates the potential for adverse noncancer effects. The estimated target organ HIs between 2 and 200 indicate that the potential for adverse effects could occur from exposure to contaminated groundwater containing benzene, carbon tetrachloride, arsenic, cadmium, and manganese.

Source: A Guide to Preparing Superfund Proposed Plans, Records of Decision, and Other Remedy Selection Decision Documents (U.S. EPA, 1999)

Table G-6

Occurrence, Distribution, and Selection of Chemicals of Concern (COPCs)

IRON HORSE PARK SUPERFUND SITE - OU-4
Medium: Surface Water

Chemical[1]	Frequency of Detection	Maximum Detected Concentration (ug/L)	Location of Maximum Detected Conc.	Screening Toxicity Value (ug/L)	Screening Toxicity Value Source	HQ	COPC?	Reason for Exclusion[6]
Inorganics (Total)								
Aluminum[2]	12/12	152	SW-CB-02	87	NRWQC	1.7	Yes	
Inorganics (Dissolved)								
Aluminum	9/12	54.2	SW-CB-03					
Arsenic	12/12	2.8	SW-RP-01 and SW-RP-02	150	NRWQC [3]	<1		BSV
Barium	12/12	39.4	SW-CB-03	4	Tier II	9.9	Yes	
Calcium	12/12	13,400	SW-RP-01	NA	NA	NA		NUT
Chromium	0/12	ND	ND	35	NRWQC [4],[5]	NA		DF
Cobalt	1/12	1.1	SW-CB-03	3	Tier II	<1		BSV
Copper	0/12	ND	ND	4.1	NRWQC [4]	NA		DF
Lead	12/12	0.83	SW-BM-01	0.9	NRWQC [4]	<1		BSV
Magnesium	12/12	3,190	SW-RP-01	NA	NA	NA		NUT
Manganese	12/12	274	SW-CB-03	80	Tier II	3.4	Yes	
Silver	0/12	ND	ND	0.36	SCV	NA		DF
Vanadium	0/12	ND	ND	19	Tier II	NA		DF
Zinc	5/12	12.6	SW-CB-03	55	NRWQC [4]	<1		BSV

Notes:

[1] Chemicals identified in the 1997 BERA with maximum detected concentrations exceeding screening criteria were evaluated in the ERA/WRIA.

[2] The NRWQC for aluminum is based on total concentration. For other metals, the dissolved metals concentrations are compared to screening benchmarks because dissolved concentrations correspond to the NRWQC or TIER II value and represent the bioavailable form of the metal.

[3] Value reported for arsenic(III).

[4] Metals criteria adjusted for hardness (40.2 mg/L as $CaCO_3$) using equations provided in USEPA, 2002.

[5] Value reported for chromium(III). It is assumed that chromium in surface water is present in reduced form.

[6] Reasons for exclusion were that maximum detected level was below the screening value (BSV), the frequency of detection was less than or equal to 5% (DF), and/or the analyte was an essential nutrient (NUT).

COPC - Contaminant of potential concern
HQ - Hazard Quotient (ratio of the maximum detected concentration to the screening toxicity value)
ND - Not Detected
NRWQC - Freshwater Chronic National Recommended Water Quality Criterion (USEPA 1986a,b; 1987; 1992a, 1998, 2002).
SCV - Secondary Chronic Value as presented in Suter and Tsao (1996).
Tier II - Ecotox Thresholds Great Lakes Water Quality Initiative Tier II Methodology (USEPA, 1996).
NA - Screening criterion Not Available
BSV - Below Screening Value
DF - Detection Frequency
NUT - Nutrient

Table G-7								
Occurrence, Distribution, and Selection of Chemicals of Potential Concern (COPCs)								
IRON HORSE PARK SUPERFUND SITE - OU-4 **Medium: Sediment**								
Chemical[1]	**Frequency of Detection**	**Maximum Detected Concentration**	**Location of Maximum Detected Conc.**	**Screening Toxicity Value[2]**	**Screening Toxicity Value Source**	**HQ**	**COPC?[2]**	**Reason for Exclusion[3]**
PAHs (ug/kg)								
Acenaphthene	4/4	4,350	SED-05	620	SQC	7.0	Yes	
Acenaphthylene	4/4	3,050	SED-05	44	ERL	69.3	Yes	
Anthracene	4/4	5,550	SED-05	85.3	ERL	65.1	Yes	
Benzo(a)anthracene	4/4	10,850	SED-05	261	ERL	41.6	Yes	
Benzo(a)pyrene	4/4	8,150	SED-05	430	ERL	19.0	Yes	
Benzo(b)fluoranthene	4/4	8,600	SED-05	240	LEL[4]	35.8	Yes	
Benzo(e)pyrene	4/4	5,500	SED-05	NA	NA	NA	Yes	
Benzo(g,h,i)perylene	4/4	3,750	SED-05	170	LEL	22.1	Yes	
Benzo(k)fluoranthene	4/4	7,650	SED-05	240	LEL	31.9	Yes	
Chrysene	4/4	11,050	SED-05	384	ERL	28.8	Yes	
Dibenz(a,h)anthracene	4/4	1,600	SED-05	63.4	ERL	25.2	Yes	
2,6-Dimethylnaphthalene	4/4	1,015	SED-05	NA	NA	NA	Yes	
Fluoranthene	4/4	17,500	SED-05	2900	SQC	6.0	Yes	
Fluorene	4/4	5,100	SED-05	540	SQB	9.4	Yes	
Indeno(1,2,3-cd)pyrene	4/4	4,450	SED-05	200	LEL	22.3	Yes	
1-Methylnaphthalene	4/4	2,100	SED-05	130	SCV	16.2	Yes	
2-Methylnaphthalene	4/4	2,550	SED-05	70	ERL	36.4	Yes	
1-Methylphenanthrene	4/4	910	SED-05	NA	NA	NA	Yes	
Naphthalene	4/4	2,250	SED-05	480	SQB	4.7	Yes	
Perylene	4/4	2,000	SED-05	NA	NA	NA	Yes	
Phenanthrene	4/4	10,100	SED-05	850	SQC	11.9	Yes	
Pyrene	4/4	11,650	SED-05	660	ERL	17.7	Yes	
2,3,5-Trimethylnaphthalene	4/4	250	SED-05	NA	NA	NA	Yes	
Total PAH[5]	4/4	129,975	SED-05	4022	ERL	32.3	Yes	
Other SVOCs (ug/kg)								
Biphenyl	4/4	121	SED-05	1,100	SQB	<1		BSV
Dibenzofuran	4/4	2,950	SED-05	2000	SQB	1.5	Yes	
Pesticides/PCBs (ug/kg)								
4,4'-DDD	3/3	92.5	SED-05	2	ERL	46.3	Yes	
Aroclor-1016	0/4	ND	ND	5	LEL			DF[6]
Aroclor-1221	0/4	ND	ND	120	SCV			DF[6]
Aroclor-1232	0/4	ND	ND	7	LEL			DF[6]
Aroclor-1242	1/4	22.8	SED-11	NA	NA	NA	Yes	
Aroclor-1248	1/4	14.8	SED-01	30	LEL	<1		BSV
Aroclor-1254	2/4	2,695	SED-05	60	LEL	44.9	Yes	
Aroclor-1260	3/4	1,940	SED-05	5	LEL	388.0	Yes	

Table G-7

Occurrence, Distribution, and Selection of Chemicals of Potential Concern (COPCs)

IRON HORSE PARK SUPERFUND SITE - OU-4
Medium: Sediment

Chemical[1]	Frequency of Detection	Maximum Detected Concentration	Location of Maximum Detected Conc.	Screening Toxicity Value[2]	Screening Toxicity Value Source	HQ	COPC?[2]	Reason for Exclusion[3]
Inorganics (mg/kg)								
Aluminum	4/4	16,000	SED-18	25,500	TEL	<1		BSV
Arsenic	4/4	360	SED-01	8.2	ERL	43.9	Yes	
Barium	4/4	370	SED-01	NA	NA	NA	Yes	
Chromium	4/4	695	SED-05	81	ERL	8.6	Yes	
Cobalt	4/4	31	SED-05	50	LEL*	<1		BSV
Copper	4/4	700	SED-05	34	ERL	20.6	Yes	
Lead	4/4	810	SED-05	47	ERL	17.2	Yes	
Manganese	4/4	1,600	SED-01	460	LEL	3.5	Yes	
Silver	4/4	0.72	SED-05	1.0	ERL	<1		BSV
Vanadium	4/4	44	SED-05	NA	NA	NA	Yes	
Zinc	4/4	3,550	SED-05	150	ERL	23.7	Yes	

Notes:

(1) Results presented for SED-05 are average values for SED-05 and its duplicate SED-25

(2) Organic benchmarks based on 1% sediment organic carbon content

(3) Reasons for exclusion were that the maximum detected level was below the screening value (BSV) and/or the frequency of detection was less than or equal to 5% (DF)

(4) Screening value for benzo(k)fluoranthene

(5) Total PAHs calculated as the sum of detected individual PAH concentrations

(6) Aroclor-1016, Aroclor-1221, and Aroclor-1232 were eliminated based on DF; however the detection limits for these chemicals at SED-05 exceeded the screening benchmarks, and thus are considered sources of uncerainty.

DF - detection frequency
BSV - below screening value
COPC - Contaminant of potential concern
ERL - NOAA Effects Range-Low (Long *et al*., 1995; Long and Morgan, 1990)
SCV - Secondary Chronic Value (Jones *et al*., 1997)
SQC - USEPA Sediment Quality Criterion (USEPA, 1996)
SQB - USEPA Office of Solid Waste and Emergency Response Sediment Quality Benchmark (USEPA, 1996)
LEL - Ontario Ministry of Environment and Energy Lowest Effect Level (Persaud *et al*., 1993)
LEL*- Ontario Ministry of Environment and Energy Lowest Effect Level (OME, 1996)
TEL - Threshold Effects Level (Buchman, 1999)
HQ - Hazard Quotient (ratio of the maximum detected concentration to the screening toxicity value).
NA - not available
ND - not detected

Table G-8

Ecological Exposure Pathways of Concern

Exposure Media	Sensitive Environment Flag Y or N	Receptor	Endangered/ Threatened Species Flag Y or N	Exposure Routes	Assessment Endpoints	Measurement Endpoints
AQUATIC LIFE						
Surface water	N	Aquatic invertebrates and fish populations	N	Ingestion and direct contact with chemicals in surface water	Survival and growth of potential fish and invertebrate communities	- Comparison of surface water COPC concentrations to criteria/benchmarks
Surface water	N	Warmwater fish populations	N	Ingestion and direct contact with chemicals in surface water	Survival and growth of populations of warmwater fish	- Toxicity of surface water to fathead minnow (*Pimphales promealas*) in laboratory bioassays
Surface water	N	Warmwater fish populations	N	Ingestion and direct contact with chemicals in surface water	Survival and growth of populations of warmwater fish	- Compare tissue concentrations of COPCs measured in fish caught within the site to those same tissue concentrations to fish caught at reference locations
Surface water	N	Warmwater fish populations	N	Ingestion and direct contact with chemicals in surface water	Survival and growth of populations of warmwater fish	- Compare tissue concentrations of COPCs measured in fish caught within the site to published fish tissue benchmarks which are indicative of potential impairment
Surface water	N	Aquatic Invertebrates	N	Ingestion and direct contact with chemicals in sediment	Survival and growth of local populations of zooplankton	- Compare toxicity of surface water samples collected in four on-site water bodies to samples collected from reference locations using the daphnid (*Daphnia dubia*) laboratory bioassays
BENTHIC INVERTEBRATE COMMUNITY						
Sediment	N	Benthic Invertebrates	N	Ingestion and direct contact with chemicals in sediment	Survival and growth of benthic invertebrates communities	- Comparison of sediment COPC concentrations to benchmarks
	N	Benthic Invertebrates	N	Ingestion and direct contact with chemicals in sediment	Survival and growth of benthic invertebrates communities	- Compare toxicity of sediment samples collected at the site to samples collected from reference locations using *Hyalella azteca* and *Chironomus tentans* laboratory bioassays
WILDLIFE RECEPTORS						
Surface water, sediment, biota	N	Avian wildlife species (piscivore)	N	Dietary exposures of COPCs	Sustainability (survival, growth, reproduction) of local populations of Great Blue Heron	- Quantify the average and maximum daily exposures to COPCs in the great blue heron via the consumption of animal prey (100% fish); compare these modeled exposures to published values which are indicative of potential impairment

Notes:

COPC - Chemical of Potential Concern

TABLE G-9

SUMMARY OF RISK BY ASSESSMENT ENDPOINT

Location	Risk Category[1]	Explanation
Aquatic Receptors		
Richardson Pond	Negligible	• No toxicity compared to reference locations • No tissue benchmark exceedances in fish
West Middlesex Canal	Low	• Statistically significant toxicity for one endpoint based on comparisons to reference locations • No tissue benchmark exceedances in fish
B&M Pond	Negligible	• No toxicity compared to reference locations • No tissue benchmark exceedances in fish
Content Brook	Negligible	• No toxicity compared to reference locations • No tissue benchmark exceedances in fish
Great Blue Heron		
Sitewide	Negligible	• No HQs > 1 in dietary models using NOAEL TRVs and maximum exposure concentrations
Benthic Invertebrates		
Unnamed Brook	Moderate	• Statistically significant toxicity to more than one receptor based on comparisons to reference locations
West Middlesex Canal	Low	• Statistically significant toxicity for one endpoint based on comparisons to reference locations
B&M Pond	Moderate	• Statistically significant toxicity for one endpoint based on comparisons to reference locations and the number and magnitude of sediment benchmark exceedances
Content Brook	Negligible	• No toxicity compared to reference locations

Notes:

(1) Level of risk assigned according to categories (negligible, low, moderate, or high) as described in Table 7-8 and Section 7.2 of the ERA/WRIA

Table G-10

COC Concentrations Expected to Provide Adequate Protection of Ecological Receptors

Habitat Type/Name	Exposure Medium	COC	Protective Level	Units	Basis[1]	Assessment Endpoint
BENTHIC INVERTEBRATE COMMUNITY						
Unnamed Brook and B&M Pond	Sediment	Total PAHs	4,834	ug/kg	Site-specific MATC	- Survival and growth of benthic invertebrates communities
		4,4'-DDD	16	ug/kg	Site-specific MATC	
		Total PCBs [2]	1 [3]	mg/kg	See note (3)	
		Chromium	22	mg/kg	Site-specific MATC	
		Copper	63	mg/kg	Site-specific MATC	
		Lead	115	mg/kg	Site-specific MATC	
		Vanadium	23	mg/kg	Site-specific MATC	
		Zinc	128	mg/kg	Site-specific MATC	

Notes:

(1) The MATC (set as the geometric mean between the NOEC and LOEC values) has been selected as the protective level for each COC except Total PCBs.

(2) See Appendix A of the Feasibility Study (M&E, 2010) for discussion of Total PCBs Preliminary Remediation Goal (PRG) development.

(3) EPA selected a Total PCB concentration of 1 mg/kg as sediment protective level based on a finding made under TSCA regulations at 40 C.F.R. 761.61(c) that the level will not will not pose an unreasonable risk of injury to health or the environment..

COC - Chemical of Concern

NOEC - No observed effect concentration. The NOEC was set as the higher of the concentrations observed at locations with no observed effects.

LOEC - Lowest observed effect concentration. The LOEC was set as the lower of the concentrations observed at locations with observed toxicity to benthic invertebrates.

MATC - Maximum Acceptable Toxic Concentration

TABLE J-1. DETAILED EVALUATION - SEDIMENT
SD-1: NO ACTION

EVALUATION CRITERIA	DETAILED ANALYSIS
OVERALL PROTECTION OF HUMAN HEALTH AND THE ENVIRONMENT	
Human Health Protection	There were no unacceptable human health risks associated with site sediment. There would be no short-term human health risks associated with this alternative.
Ecological Protection	This alternative would not provide protection of ecological receptors from potential risks due to exposure to sediments in the B&M Pond and the Unnamed Brook identified in the Ecological Risk Assessment/Wetlands Remedial Investigation Addendum (ERA/WRIA; M&E, 2006a). There would be no additional short-term ecological risks associated with this alternative.
COMPLIANCE WITH ARARS	
Chemical-, Location-, and Action-Specific	Under current conditions, chemical-specific To Be Considered criteria for sediment have not been met. Therefore, this alternative would not be considered as meeting ARARs. Refer to Table C-3 in Appendix C for a list of ARARs associated with this alternative.
LONG-TERM EFFECTIVENESS AND PERMANENCE	
Magnitude of Residual Risk	Since this alternative includes no controls to reduce potential exposures to contaminated sediments, any potential residual risk would not be changed.
Adequacy and Reliability of Controls	This alternative does not include any controls to reduce potential future exposures to contaminated sediments.
REDUCTION OF TOXICITY, MOBILITY, AND VOLUME THROUGH TREATMENT	
Treatment Process Used and Materials Treated	No treatment would be performed under this alternative.
Amount Destroyed or Treated	No treatment would be performed under this alternative.
Degree of Expected Reductions of Toxicity, Mobility, or Volume through Treatment	No treatment would be performed under this alternative.
Degree to which Treatment is Irreversible	No treatment would be performed under this alternative.

TABLE J-1. DETAILED EVALUATION - SEDIMENT
SD-1: NO ACTION

EVALUATION CRITERIA	DETAILED ANALYSIS
Type and Quantity of Residuals Remaining after Treatment	No treatment would be performed under this alternative.
SHORT-TERM EFFECTIVENESS	
Protection of Community During Remedial Actions	Since this alternative involves no construction or monitoring measures, there would be no additional short-term risks to the community from the remedy.
Protection of Workers During Remedial Actions	Since this alternative involves no construction or monitoring measures, there would be no additional short-term risks to workers from the remedy.
Environmental Impacts	Since this alternative involves no construction or monitoring measures, there would be no adverse, short-term environmental impacts associated with the remedy.
Time to Achieve Remedial Action Objectives	This alternative would not achieve RAOs.
IMPLEMENTABILITY	
Ability to Construct and Operate	No construction or operation would be performed under this alternative.
Reliability of the Technology	No technologies would be implemented under this alternative.
Ease of Undertaking Additional Remedial Actions, If needed	If further action is deemed necessary in the future, this alternative would allow for additional remedial actions to occur.
Ability to Monitor Effectiveness	No monitoring would be conducted under this alternative, except for five-year reviews. Therefore, the effectiveness would not be evaluated, except as part of the five-year review process for the entire Site.
Ability to Obtain Approvals and Coordinate with Other Agencies	No approvals would likely be needed for this alternative.
Availability of Off-Site Treatment, Storage, and Disposal Services and Capacity	No off-site treatment, storage, or disposal services would be needed under this alternative.
Availability of Necessary Equipment and Specialists	No equipment or specialists would be needed under this alternative.
Availability of Technology	No technologies would be needed for this alternative.

TABLE J-1. DETAILED EVALUATION - SEDIMENT
SD-1: NO ACTION

EVALUATION CRITERIA	DETAILED ANALYSIS
COSTS	
Capital Cost	--
Net Present Worth of O&M Costs	--
Net Present Worth of Periodic Costs	$24,800
Total Net Present Worth Cost	$24,800

TABLE J-2. DETAILED EVALUATION - SEDIMENT
SD-4: SOURCE CONTROL – EXCAVATION (B&M POND) WITH DISPOSAL

EVALUATION CRITERIA	DETAILED ANALYSIS
OVERALL PROTECTION OF HUMAN HEALTH AND THE ENVIRONMENT	
Human Health Protection	There were no unacceptable human health risks associated with site sediment. Short-term human health risks associated with excavation, disposal, and environmental monitoring would be mitigated through the use of proper personal protection equipment (PPE).
Ecological Protection	Through removal of contaminated sediments in B&M Pond and via MNR in areas outside the excavation (including Unnamed Brook), this alternative would provide protection of ecological receptors from potential risks due to exposure to sediments identified in the Ecological Risk Assessment/Wetlands Remedial Investigation Addendum (ERA/WRIA; M&E, 2006a). Based on available monitoring data, it is assumed that the MNR time frame to achieve PRGs would be less than 20 years (see Appendix B). Short-term impacts to ecological habitat would occur as a result of the sediment excavation. Wetland mitigation, including replacement of the excavated sediment, will be performed. Short-term, minor impacts to ecological habitat due to environmental monitoring would also occur.
COMPLIANCE WITH ARARS	
Chemical-, Location-, and Action-Specific	All chemical-, location-, and action-specific ARARs would be complied with. The PCB cleanup level meets TSCA risk-base standards that will not pose an unreasonable risk of injury to health or the environment. Refer to Table C-4 in Appendix C for a list of ARARs associated with this alternative.
LONG-TERM EFFECTIVENESS AND PERMANENCE	
Magnitude of Residual Risk	The excavation would be expected to significantly reduce ecological risks for B&M Pond sediment. Outside of this excavation, the residual risk is expected to be reduced to acceptable levels over time as the PRGs are approached/achieved through MNR.
Adequacy and Reliability of Controls	Excavation is a reliable means for removing contaminated sediment. Based on site monitoring results, MNR is an adequate and reliable method for achieving RAOs within the non-excavated wetlands that exceed ecological risk levels on Site.
REDUCTION OF TOXICITY, MOBILITY, AND VOLUME THROUGH TREATMENT	
Treatment Process Used and Materials Treated	While sediment excavation will be conducted, no treatment would be performed under this alternative other than potential treatment of dewatering fluid or possible stabilization of sediments prior before disposal.

TABLE J-2. DETAILED EVALUATION - SEDIMENT
SD-4: SOURCE CONTROL – EXCAVATION (B&M POND) WITH DISPOSAL

EVALUATION CRITERIA	DETAILED ANALYSIS
Amount Destroyed or Treated	The limited treatment that might be performed under this alternative is not expected to treat a large volume of contaminants.
Degree of Expected Reductions of Toxicity, Mobility, or Volume through Treatment	Limited treatment might be performed under this alternative.
Degree to which Treatment is Irreversible	Limited treatment might be performed under this alternative.
Type and Quantity of Residuals Remaining after Treatment	Limited treatment might be performed under this alternative.
SHORT-TERM EFFECTIVENESS	
Protection of Community During Remedial Actions	Short-term community risks associated with remedy implementation and environmental monitoring would be minor. Off-site sediment disposal will result in increased local truck traffic. However, these impacts would be mitigated as necessary.
Protection of Workers During Remedial Actions	Short-term worker risks associated with remedy implementation and environmental monitoring would be mitigated through the use of proper PPE.
Environmental Impacts	Short-term impacts to ecological habitat would occur as a result of the excavation, but wetland mitigation would be performed as required.
Time to Achieve Remedial Action Objectives	Achieving RAOs associated with sediment exposure to ecological receptors would occur immediately in the areas to be excavated, but would take a extended period of time in the areas subject to MNR. Based on available monitoring data, it is assumed that RAOs would be achieved in the MNR areas in less than 20 years (see Appendix B).
IMPLEMENTABILITY	
Ability to Construct and Operate	Sediment excavation or dredging within wetland areas is common, but can often be difficult to implement. Access will likely occur via a roadway over the planned cap for B&M Railroad Landfill (AOC 1 under OU-3), so care will be necessary so as to not damage the cap. MNR is now considered a common remedy for sediment. However, monitoring for parameters such as sediment types, erosion, deposition, and other fate and transport properties can be difficult in a wetland environment.
Reliability of the Technology	Excavation is known to be reliable. Based on available site data, MNR is expected to be reliable. While high flow conditions can both remove contaminants as well as cover sediments, the site streams/water bodies do not appear to achieve flow rates which would reduce the reliability of the remedy.

TABLE J-2. DETAILED EVALUATION - SEDIMENT
SD-4: SOURCE CONTROL – EXCAVATION (B&M POND) WITH DISPOSAL

EVALUATION CRITERIA	DETAILED ANALYSIS
Ease of Undertaking Additional Remedial Actions, If needed	If further action is deemed necessary in the future, this alternative would allow for additional remedial actions to occur on remaining unexcavated sediments.
Ability to Monitor Effectiveness	Monitoring (both confirmatory around the excavation and in other MNR areas outside the excavation) would be conducted to evaluate the effectiveness of the remedy.
Ability to Obtain Approvals and Coordinate with Other Agencies	Approvals for disposal of contaminated sediment and water from dewatering would require coordination with other agencies. Sediment monitoring may require coordination with other agencies (e.g., conservation commission and/or property owners). ICs to protect stormwater controls and to prevent disturbance of wetlands undergoing MNR would also require coordination with other agencies.
Availability of Off-Site Treatment, Storage, and Disposal Services and Capacity	Multiple facilities would be able to accept the excavated materials for final disposition (although on-site disposal areas may also be available).
Availability of Necessary Equipment and Specialists	There are many contractors available to provide the equipment and services required by this alternative.
Availability of Technology	This alternative contains commonly-used technologies.
COSTS	
Capital Cost	$3,423,744
Net Present Worth of O&M Costs	$627,458
Net Present Worth of Periodic Costs	$21,180
Total Net Present Worth Cost	$4,072,381

TABLE J-3. DETAILED EVALUATION - SEDIMENT
SD-6: SOURCE CONTROL – EXCAVATION (B&M POND AND UNNAMED BROOK) WITH DISPOSAL

EVALUATION CRITERIA	DETAILED ANALYSIS
OVERALL PROTECTION OF HUMAN HEALTH AND THE ENVIRONMENT	
Human Health Protection	There were no unacceptable human health risks associated with site sediment. Short-term human health risks associated with excavation and disposal would be mitigated through the use of proper personal protection equipment (PPE).
Ecological Protection	Through removal of contaminated sediments in B&M Pond and Unnamed Brook, this alternative would provide protection of ecological receptors from potential risks due to exposure to sediments identified in the Ecological Risk Assessment/Wetlands Remedial Investigation Addendum (ERA/WRIA; M&E, 2006a). Short-term impacts to ecological habitat would occur as a result of the sediment excavation. Wetland mitigation, including replacement of the excavated sediment, will be performed as required.
COMPLIANCE WITH ARARS	
Chemical-, Location-, and Action-Specific	All chemical-, location-, and action-specific ARARs would be complied with. The PCB cleanup level meets TSCA risk-base standards that will not pose an unreasonable risk of injury to health or the environment. Refer to Table C-5 in Appendix C for a list of ARARs associated with this alternative.
LONG-TERM EFFECTIVENESS AND PERMANENCE	
Magnitude of Residual Risk	The excavation would be expected to significantly reduce ecological risks for site sediment, where residual risk is expected to be reduced to acceptable levels as the PRGs are achieved.
Adequacy and Reliability of Controls	Excavation is a reliable means for removing contaminated sediment.
REDUCTION OF TOXICITY, MOBILITY, AND VOLUME THROUGH TREATMENT	
Treatment Process Used and Materials Treated	While sediment excavation will be conducted, no treatment would be performed under this alternative except potentially some treatment of dewatering fluid or possible stabilization of sediment before disposal.
Amount Destroyed or Treated	The limited treatment that might be performed under this alternative is not expected to treat a large volume of contaminants.
Degree of Expected Reductions of Toxicity, Mobility, or Volume through Treatment	Limited treatment might be performed under this alternative.

TABLE J-3. DETAILED EVALUATION - SEDIMENT
SD-6: SOURCE CONTROL – EXCAVATION (B&M POND AND UNNAMED BROOK) WITH DISPOSAL

EVALUATION CRITERIA	DETAILED ANALYSIS
Degree to which Treatment is Irreversible	Limited treatment might be performed under this alternative.
Type and Quantity of Residuals Remaining after Treatment	Limited treatment might be performed under this alternative.
SHORT-TERM EFFECTIVENESS	
Protection of Community During Remedial Actions	Short-term community risks associated with remedy implementation would be minor. Off-site sediment disposal will result in increased local truck traffic. However, these impacts would be mitigated as necessary.
Protection of Workers During Remedial Actions	Short-term worker risks associated with remedy implementation would be mitigated through the use of proper PPE.
Environmental Impacts	Short-term impacts to ecological habitat would occur as a result of the excavation, but wetland mitigation would be performed as required.
Time to Achieve Remedial Action Objectives	RAOs for sediment would be achieved upon removal of contaminated sediment. This is assumed to be less than five years.
IMPLEMENTABILITY	
Ability to Construct and Operate	Sediment excavation or dredging within wetland areas is common, but can often be difficult to implement. Access to B&M Pond will likely occur via a roadway over the planned cap for B&M Railroad Landfill (AOC 1 under OU-3), so care will be necessary so as to not damage the cap. Access to Unnamed Brook may be difficult in some areas and diverting the brook may also be necessary.
Reliability of the Technology	Excavation is known to be reliable.
Ease of Undertaking Additional Remedial Actions, If needed	If further action is deemed necessary in the future, this alternative would allow for additional remedial actions to occur on remaining sediments.
Ability to Monitor Effectiveness	Confirmatory sampling would be conducted to evaluate the effectiveness of the remedy.
Ability to Obtain Approvals and Coordinate with Other Agencies	Approvals for disposal of contaminated sediment and water from dewatering would require coordination with other agencies.
Availability of Off-Site Treatment, Storage, and Disposal Services and Capacity	Multiple facilities would be able to accept the excavated materials for final disposition (although on-site disposal areas may also be available).
Availability of Necessary Equipment and Specialists	There are many contractors available to provide the equipment and services required by this alternative.

TABLE J-3. DETAILED EVALUATION - SEDIMENT
SD-6: SOURCE CONTROL – EXCAVATION (B&M POND AND UNNAMED BROOK) WITH DISPOSAL

EVALUATION CRITERIA	DETAILED ANALYSIS
Availability of Technology	This alternative contains commonly-used technologies.
COSTS	
Capital Cost	$5,412,289
Net Present Worth of O&M Costs	$0
Net Present Worth of Periodic Costs	$0
Total Net Present Worth Cost	$5,412,289

Table J-4 Intentionally Omitted

TABLE J-5. DETAILED EVALUATION - GROUNDWATER
GW-1: NO ACTION

EVALUATION CRITERIA	DETAILED ANALYSIS
OVERALL PROTECTION OF HUMAN HEALTH AND THE ENVIRONMENT	
Human Health Protection	This alternative would not provide any protection of human health from risks identified in the Supplemental Human Health Risk Assessment (Supplemental HHRA; M&E, 2008a). There would be no additional short-term human health risks associated with this alternative.
Ecological Protection	There were no unacceptable ecological risks associated with site groundwater. There would be no short-term ecological risks associated with this alternative.
COMPLIANCE WITH ARARS	
Chemical-, Location-, and Action-Specific	Under current conditions, chemical-specific ARARs for groundwater have not been met. Therefore, this alternative would not meet ARARs. Refer to Table C-1 in Appendix C for a list of ARARs associated with this alternative.
LONG-TERM EFFECTIVENESS AND PERMANENCE	
Magnitude of Residual Risk	Since this alternative includes no controls to reduce potential direct contact exposures to groundwater, the residual risk would be the same as that identified in the supplemental HHRA.
Adequacy and Reliability of Controls	This alternative does not include any controls to reduce potential future exposures to groundwater.
REDUCTION OF TOXICITY, MOBILITY, AND VOLUME THROUGH TREATMENT	
Treatment Process Used and Materials Treated	No treatment would be performed under this alternative.
Amount Destroyed or Treated	No treatment would be performed under this alternative.
Degree of Expected Reductions of Toxicity, Mobility, or Volume through Treatment	No treatment would be performed under this alternative.
Degree to which Treatment is Irreversible	No treatment would be performed under this alternative.
Type and Quantity of Residuals Remaining after Treatment	No treatment would be performed under this alternative.

TABLE J-5. DETAILED EVALUATION - GROUNDWATER
GW-1: NO ACTION

EVALUATION CRITERIA	DETAILED ANALYSIS
SHORT-TERM EFFECTIVENESS	
Protection of Community During Remedial Actions	Since this alternative involves no construction or monitoring measures, there would be no additional short-term risks to the community from the remedy.
Protection of Workers During Remedial Actions	Since this alternative involves no construction or monitoring measures, there would be no additional short-term risks to workers from the remedy.
Environmental Impacts	Since this alternative involves no construction or monitoring measures, there would be no adverse, short-term environmental impacts associated with the remedy.
Time to Achieve Remedial Action Objectives	Under this alternative, RAOs would not be achieved.
IMPLEMENTABILITY	
Ability to Construct and Operate	No construction or operation would be performed under this alternative.
Reliability of the Technology	No technologies would be implemented under this alternative.
Ease of Undertaking Additional Remedial Actions, If needed	If further action is deemed necessary in the future, this alternative would allow for additional remedial actions to occur.
Ability to Monitor Effectiveness	No monitoring would be conducted under this alternative, except as part of five-year reviews. Therefore, the effectiveness would not be evaluated, except during the five-year review process for the entire Site.
Ability to Obtain Approvals and Coordinate with Other Agencies	No approvals would likely be needed for this alternative.
Availability of Off-Site Treatment, Storage, and Disposal Services and Capacity	No off-site treatment, storage, or disposal services would be needed under this alternative.
Availability of Necessary Equipment and Specialists	No equipment or specialists would be needed under this alternative.
Availability of Technology	No technologies would be needed for this alternative.
COSTS	
Capital Cost	--
Net Present Worth of O&M Costs	--
Net Present Worth of Periodic Costs	$24,800
Total Net Present Worth Cost	$24,800

TABLE J-6. DETAILED EVALUATION - GROUNDWATER GW-2: LIMITED ACTION

EVALUATION CRITERIA	DETAILED ANALYSIS
OVERALL PROTECTION OF HUMAN HEALTH AND THE ENVIRONMENT	
Human Health Protection	This alternative would eliminate potential human direct contact exposures to groundwater on Site, so long as ICs are enforced such that contaminated groundwater is not used on Site. A compliance boundary will be established whereby monitoring will confirm that any COCs migrating beyond the compliance boundary are below Site Performance Standard levels. Short-term human health risks associated with monitoring well installation and environmental monitoring would be mitigated through the use of proper personal protection equipment (PPE).
Ecological Protection	There were no unacceptable ecological risks associated with site groundwater. Short-term, minor impacts to ecological habitat due to monitoring well installation and environmental monitoring would occur.
COMPLIANCE WITH ARARS	
Chemical-, Location-, and Action-Specific	ICs will prevent exposure to Site groundwater exceeding chemical-specific ARARs and risk guidance levels. Under this alternative, monitoring will be performed to ensure that federal and state drinking water ARARs are met outside of the compliance boundary. Groundwater monitoring, in particular the installation, maintenance, and sampling of wells will be conducted in compliance with location and action-specific ARARs. Refer to Table C-2 in Appendix C for a list of ARARs associated with this alternative.
LONG-TERM EFFECTIVENESS AND PERMANENCE	
Magnitude of Residual Risk	The type and quantity of contaminants remaining at the Site following implementation of this limited action remedy is similar to current conditions, except for whatever attenuates naturally. ICs would be implemented as protection against accessing the groundwater within the Site compliance boundary and long-term monitoring will ensure that contaminated groundwater exceeding federal and state drinking water and risk standards does not migrate beyond the compliance boundary for the Site.
Adequacy and Reliability of Controls	Adequacy of the limited action alternative will be determined through long-term monitoring. ICs are reliable if properly enforced.
REDUCTION OF TOXICITY, MOBILITY, AND VOLUME THROUGH TREATMENT	
Treatment Process Used and Materials Treated	No treatment would be performed under this alternative.

TABLE J-6. DETAILED EVALUATION - GROUNDWATER
GW-2: LIMITED ACTION

EVALUATION CRITERIA	DETAILED ANALYSIS
Amount Destroyed or Treated	No treatment would be performed under this alternative.
Degree of Expected Reductions of Toxicity, Mobility, or Volume through Treatment	No treatment would be performed under this alternative.
Degree to which Treatment is Irreversible	No treatment would be performed under this alternative.
Type and Quantity of Residuals Remaining after Treatment	No treatment would be performed under this alternative.
SHORT-TERM EFFECTIVENESS	
Protection of Community During Remedial Actions	Short-term community risks associated with environmental monitoring would be minor.
Protection of Workers During Remedial Actions	Short-term worker risks associated with well installation, maintenance, and environmental monitoring would be mitigated through the use of proper PPE.
Environmental Impacts	Short-term, minor impacts to ecological habitat due to monitoring well installation, maintenance, and environmental monitoring would occur.
Time to Achieve Remedial Action Objectives	RAOs associated with preventing direct contact exposures to groundwater by future residential receptors would be assumed to be achieved upon implementation of ICs (likely less than five years). Long-term monitoring will need to be conducted in perpetuity, since OU3 waste management areas will be maintained within the compliance boundary of the Site permanently.
IMPLEMENTABILITY	
Ability to Construct and Operate	Monitoring is common and easy to implement.
Reliability of the Technology	Monitoring can be reliable to determine migration trends, but will not actively reduce contaminant concentrations. ICs are reliable in achieving RAOs as long as they are enforced.
Ease of Undertaking Additional Remedial Actions, If needed	If further action is deemed necessary in the future, this alternative would allow for additional remedial actions to occur.
Ability to Monitor Effectiveness	Multiple monitoring locations would be sampled to evaluate the effectiveness of the remedy.
Ability to Obtain Approvals and Coordinate with Other Agencies	ICs would require coordination with other agencies.

TABLE J-6. DETAILED EVALUATION - GROUNDWATER GW-2: LIMITED ACTION

EVALUATION CRITERIA	DETAILED ANALYSIS
Availability of Off-Site Treatment, Storage, and Disposal Services and Capacity	No off-site treatment, storage, or disposal services would be needed under this alternative.
Availability of Necessary Equipment and Specialists	There are many contractors available to provide the equipment and services required by this alternative.
Availability of Technology	Groundwater monitoring does not require special technologies.
COSTS	
Capital Cost	$224,577
Net Present Worth of O&M Costs	$1,012,852
Net Present Worth of Periodic Costs	$42,863
Total Net Present Worth Cost	$1,280,292

Table J-7 Intentionally Omitted

TABLE J-8. ABBREVIATED COMPARATIVE ANALYSIS OF THE REMEDIAL TECHNOLOGIES GROUNDWATER

	No Action	Limited Action
Overall Protection of Human Health and the Environment	□ - No Protection, ◪ - Partially Protective, ■ - Protective	
Protection of Human Health	□	■
Ecological Protection Does not exceed risk limits	N/A	N/A
Compliance with ARARs	□ - Does Not Meet, ◪ - May Not Meet/Partially Meets, ■ - Meets	
	□	■
Long-Term Effectiveness And Permanence	□ - No Protection, ◪ - Partially Protective, ■ - Protective	
Magnitude of Residual Risk - Human Health:	□	■
Magnitude of Residual Risk - Ecological Does not exceed risk limits	N/A	N/A
Reduction of Toxicity, Mobility and Volume through Treatment		
Treatment/Recycling Processes Utilized	None	None
Amount of Hazardous Materials Treated or Recycled	□ - Low, ◪ - Moderate, ■ - High	
	N/A	N/A
Degree of Expected Reductions in Toxicity, Mobility or Volume	□ - Low, ◪ - Moderate, ■ - High	
	N/A	N/A
Irreversibility	□ - Reversible, ◪ - Moderately Reversible, ■ - Irreversible	
	N/A	N/A
Type and Quantity of [Process] Residuals	□ - High, ◪ - Moderate, ■ - Low	
	N/A	N/A
Short-Term Effectiveness	□ - High Impacts, ◪ - Moderate Impacts, ■ - Low Impacts	
Protection of Community and Workers During Remedial Actions	■	■
Environmental Impacts	■	■
Time Until Remedial Action Objectives are Achieved	>30 years	>30 years
Implementability	□ - High Effort/Low Reliability, ◪ - Moderate Effort/Moderate Reliability, ■ - Low Effort/High Reliability	
Technical Feasibility:		
Construction, operation & maintenance	■	■
Reliability in achieving RAOs	N/A	■
Implementation of future actions	■	■
Administrative Feasibility	□ - High Effort, ◪ - Moderate to High Effort, ■ - Low to Moderate Effort	
	■	■
Availability of Services and Materials	□ - High Effort/Not Commonly Available, ◪ - Moderate Effort & Availability, ■ - Low Effort/Commonly Available	
	■	■
Cost (Present Value)		
Capital ($thousand)	$0.0	$224
O&M ($thousand)	$0.0	$1,013
Periodic ($thousand)	$24.8	$43
Total ($thousand)	$24.8	$1,280

N/A - Not Applicable

TABLE J-9. ABBREVIATED COMPARATIVE ANALYSIS OF THE REMEDIAL TECHNOLOGIES SEDIMENT

	No Action	Source Control - Excavation (B&M Pond) with Disposal	Source Control - Excavation (B&M Pond and Unnamed Brook) with Disposal
Overall Protection of Human Health and the Environment	□ - No Protection, ◪ - Partially Protective, ■ - Protective		
Protection of Human Health Does not exceed risk limits	N/A	N/A	N/A
Ecological Protection	□	■	■
Compliance with ARARs	□ - Does Not Meet, ◪ - May Not Meet/Partially Meets, ■ - Meets		
	□	■ (1)	■
Long-Term Effectiveness And Permanence	□ - No Protection, ◪ - Partially Protective, ■ - Protective		
Magnitude of Residual Risk - Human Health: Does not exceed risk limits	N/A	N/A	N/A
Magnitude of Residual Risk - Ecological	□	■	■
Reduction of Toxicity, Mobility and Volume through Treatment			
Treatment/Recycling Processes Utilized	None	Limited	Limited
Amount of Hazardous Materials Treated or Recycled	□ - Low, ◪ - Moderate, ■ - High		
	N/A	Limited	Limited
Degree of Expected Reductions in Toxicity, Mobility or Volume	□ - Low, ◪ - Moderate, ■ - High		
	N/A	Limited	Limited
Irreversibility	□ - Reversible, ◪ - Moderately Reversible, ■ - Irreversible		
	N/A	Limited	Limited
Type and Quantity of [Process] Residuals	□ - High, ◪ - Moderate, ■ - Low		
	N/A	Limited	Limited
Short-Term Effectiveness	□ - High Impacts, ◪ - Moderate Impacts, ■ - Low Impacts		
Protection of Community and Workers During Remedial Actions	■	◪	◪
Environmental Impacts	■	◪	◪
Time Until Remedial Action Objectives are Achieved	Would not meet RAOs	< 20 years	< 5 years
Implementability	□ - High Effort/Low Reliability, ◪ - Moderate Effort/Moderate Reliability, ■ - Low Effort/High Reliability		
Technical Feasibility:			
Construction, operation & maintenance	N/A	◪	◪
Reliability in achieving RAOs	N/A	■	■
Implementation of future actions	■	■	■
Administrative Feasibility	□ - High Effort, ◪ - Moderate to High Effort, ■ - Low to Moderate Effort		
	■	◪	◪
Availability of Services and Materials	□ - High Effort/Not Commonly Available, ◪ - Moderate Effort & Availability, ■ - Low Effort/Commonly Available		
	■	■	■
Cost (Present Value)			
Capital ($thousand)	$0.0	$3,424	$5,412
O&M ($thousand)	$0.0	$627	$0
Periodic ($thousand)	$24.8	$21	$0
Total ($thousand)	$24.8	$4,072	$5,412

N/A - Not Applicable

(1) - Least Environmentally Damaging Practicable Alternative under the federal Clean Water Act

Table L-1: Sediment Cleanup Levels for the Protection of Ecological Receptors

Habitat Type/Name	Exposure Medium	COC	Protective Level	Units	Basis[1]	Assessment Endpoint
BENTHIC INVERTEBRATE COMMUNITY						
Unnamed Brook and B&M Pond	Sediment	Total PAHs	4,834	ug/kg	Site-specific MATC	- Survival and growth of benthic invertebrates communities
		4,4'-DDD	16	ug/kg	Site-specific MATC	
		Total PCBs (2)	1 (3)	mg/kg	See note (3)	
		Chromium	22	mg/kg	Site-specific MATC	
		Copper	63	mg/kg	Site-specific MATC	
		Lead	115	mg/kg	Site-specific MATC	
		Vanadium	23	mg/kg	Site-specific MATC	
		Zinc	128	mg/kg	Site-specific MATC	

Notes:

(1) The MATC (set as the geometric mean between the NOEC and LOEC values) has been selected as the protective level for each COC except Total PCBs.

(2) See Appendix A of the Feasibility Study (M&E, 2010) for discussion of Total PCBs Preliminary Remediation Goal (PRG) development.

(3) EPA selected an average Total PCB concentration of 1 mg/kg as sediment protective level based on TSCA 40 CFR 761.61(c) risk-based cleanup level.

COC - Chemical of Concern

NOEC - No observed effect concentration. The NOEC was set as the higher of the concentrations observed at locations with no observed effects.

LOEC - Lowest observed effect concentration. The LOEC was set as the lower of the concentrations observed at locations with observed toxicity to benthic invertebrates.

MATC - Maximum Acceptable Toxic Concentration.

Table L-2: Groundwater Performance Standards - Residential Scenario			
Carcinogenic Chemical of Concern	**Cancer Classification**	**Performance Standard (ug/L)**	**Basis**
1,2-Dichloroethane	B2	5	MCL
1,4-Dichlorobenzene	C	5	MMCL
Benzene	A	5	MCL
Carbon Tetrachloride	B2	5	MCL
cis-1,3-Dichloropropene	B2	0.49	1E-6 risk
Tetrachloroethene	B2	5	MCL
Trichloroethene	C-B2	5	MCL
Vinyl Chloride	A	2	MCL
Atrazine	C	3	MCL
Bis(2-chloroethyl)ether	B2	0.5	PQL
Dibenz(a,h)anthracene	B2	0.1	PQL
Dieldrin	B2	0.01	PQL
Arsenic	A	10	MCL
Non-Carcinogenic Chemical of Concern	**Target Endpoint**	**Performance Standard (ug/L)**	**Basis**
1,2-Dichloroethane	N/A	5	MCL
1,4-Dichlorobenzene	N/A	5	MMCL
Benzene	Immune System	5	MCL
Carbon Tetrachloride	Liver	5	MCL
cis-1,3-Dichloropropene	GI System	0.49	risk
Tetrachloroethene	Liver	5	MCL
Vinyl Chloride	Liver	2	MCL
Atrazine	General Toxicity/Cardiovascular	3	MCL
Bis(2-chloroethyl)ether	N/A	0.5	PQL
Dibenz(a,h)anthracene	N/A	0.1	PQL
Dieldrin	Liver	0.01	PQL
Arsenic	Skin	10	MCL
Cadmium	Kidney	5	MCL
Lead [1]	CNS	15	Action Level
Manganese	CNS	300	Health Adv.

Key

Health Advisory - Health Advisory on Manganese presented in EPA-822-R-04-003; January 2004

MCL - Maximum Contaminant Level

MMCL - Massachusetts Maximum Contaminant Level

PQL - Practical Quantification Limit; While it may be possible to achieve lower limits, those that are reasonably achievable have been included.

HQ - Hazard Quotient

N/A - Not Available or Not Applicable

(1) Lead was identified in the Supplemental HHRA as a risk-driver, however, it was not quantitatively evaluated. Therefore, the performance standard has been established as the EPA Drinking Water Action Level.

TABLE L-3a. CHEMICAL-SPECIFIC ARARS, CRITERIA, ADVISORIES, AND GUIDANCE FOR ALTERNATIVE SD-4: SOURCE CONTROL - EXCAVATION (B&M POND) WITH DISPOSAL

Authority	Requirement	Status	Requirement Synopsis	Action to be Taken
Federal Criteria, Advisories, and Guidance	EPA Risk Reference Dose (RfDs)	To Be Considered	RfDs are considered to be the levels unlikely to cause significant adverse health effects associated with a threshold mechanism of action in human exposure for a lifetime.	Although to date, no sediments exceeding these risk-based human health standards have been identified, sampling of the sediments during the excavation of B&M Pond and during the MNR of the remaining sediments will ensure that no contaminants are present exceeding these standards.
	EPA Carcinogenicity Slope Factor	To Be Considered	Slope factors are developed by EPA from health effects assessments. Carcinogenic effects present the most up-to-date information on cancer risk potency. Potency factors are developed by EPA from Health Effects Assessments of evaluation by the Carcinogenic Assessment Group.	Although to date, no sediments exceeding these risk-based human health standards have been identified, sampling of the sediments during the excavation of B&M Pond and during the MNR of the remaining sediments will ensure that no contaminants are present exceeding these standards.
	Guidelines for Carcinogen Risk Assessment EPA/630/P-03/001F (March 2005)	To Be Considered	Guidance for assessing cancer risk.	Although to date, no sediments exceeding these risk-based human health standards have been identified, sampling of the sediments during the excavation of B&M Pond and during the MNR of the remaining sediments will ensure that no contaminants are present exceeding these standards.
	Supplemental Guidance for Assessing Susceptibility from Early-Life Exposure to Carcinogens EPA/630/R-03/003F (March 2005)	To Be Considered	Guidance of assessing cancer risks to children.	Although to date, no sediments exceeding these risk-based human health standards have been identified, sampling of the sediments during the excavation of B&M Pond and during the MNR of the remaining sediments will ensure that no contaminants are present exceeding these standards.
	U.S. DOE, Office of Environmental Management, Secondary Chronic Values (SCVs) (Jones et al., 1997)	To Be Considered	The SCVs are toxicological benchmarks for screening contaminants of potential concern for effects on sediment-associated biota.	Ecological risks at the Site identified using this guidance will be addressed by excavation of contaminated sediment at the B&M Pond and monitored natural recovery of all other sediment areas exceeding ecological risk levels. If through MNR sediment exceeding risk standards is naturally covered in place, institutional controls will be established to prevent disturbance of the sediments as long as ecological risk standards identified through this guidance are exceeded.
	U.S. EPA Sediment Quality Criterion (SQC) and Sediment Quality Benchmarks (SQBs) (USEPA, 1996)	To Be Considered	SQCs and SQBs were established to provide screening toxicity thresholds.	Ecological risks at the Site identified using this guidance will be addressed by excavation of contaminated sediment at the B&M Pond and monitored natural recovery of all other sediment areas exceeding ecological risk levels. If through MNR sediment exceeding risk standards is naturally covered in place, institutional controls will be established to prevent disturbance of the sediments as long as ecological risk standards identified through this guidance are exceeded.

ALTERNATIVE SD-4: SOURCE CONTROL - EXCAVATION (B&M POND) WITH DISPOSAL

Authority	Requirement	Status	Requirement Synopsis	Action to be Taken
	NOAA Screening Quick Reference Tables, Threshold Effects Level (TEL) (Buchman, 1999)	To Be Considered	TELs represent the concentration below which adverse effects are expected to occur only rarely.	Ecological risks at the Site identified using this guidance will be addressed by excavation of contaminated sediment at the B&M Pond and monitored natural recovery of all other sediment areas exceeding ecological risk levels. If through MNR sediment exceeding risk standards is naturally covered in place, institutional controls will be established to prevent disturbance of the sediments as long as ecological risk standards identified through this guidance are exceeded.
	Ontario Ministry of Environment and Energy (OMEE) Lowest Effect Levels (LELs) for Freshwater Sediments (Persaud et al., 1993)	To Be Considered	The LEL value is the concentration at which the majority of the sediment-dwelling organisms are not affected.	Ecological risks at the Site identified using this guidance will be addressed by excavation of contaminated sediment at the B&M Pond and monitored natural recovery of all other sediment areas exceeding ecological risk levels. If through MNR sediment exceeding risk standards is naturally covered in place, institutional controls will be established to prevent disturbance of the sediments as long as ecological risk standards identified through this guidance are exceeded.
	Development and Evaluation of Consensus-Based Sediment Quality Guidelines for Freshwater Ecosystems. Probable Effects Concentrations (PECs) (MacDonald et al., 2000)	To Be Considered	The PEC value is the concentration above which the adverse effects on sediment-dwelling organisms are likely to occur.	Ecological risks at the Site identified using this guidance will be addressed by excavation of contaminated sediment at the B&M Pond and monitored natural recovery of all other sediment areas exceeding ecological risk levels. If through MNR sediment exceeding risk standards is naturally covered in place, institutional controls will be established to prevent disturbance of the sediments as long as ecological risk standards identified through this guidance are exceeded.

TABLE L-3b. LOCATION-SPECIFIC ARARS, CRITERIA, ADVISORIES, AND GUIDANCE FOR ALTERNATIVE SD-4: SOURCE CONTROL - EXCAVATION (B&M POND) WITH DISPOSAL

Authority	Requirements	Status	Requirement Synopsis	Applicability To Site Conditions
Wetlands, Floodplains, Streams, or Water Bodies				
Federal ARARs	Fish and Wildlife Coordination Act (16 U.S.C.. §661 *et seq*.)	Applicable	Any modification of a body of water requires consultation with the U.S. Fish and Wildlife Services and the appropriate state wildlife agency to develop measures to prevent, mitigate, or compensate for losses of fish and wildlife.	Since the remedy will impact streams, wetlands, and downstream waterbodies, planning and decision-making will incorporate fish and wildlife protection considerations in consultation with federal and state resource agencies.
	Floodplain Management and Protection of Wetlands, 44 C.F.R. 9	Relevant and Appropriate	Remedial alternatives that may cause alteration within a 500-year floodplain/cause negative impacts to downstream floodplain or that will cause alteration of federal jurisdictional wetlands/aquatic habitats will be implemented in compliance with these relevant and appropriate FEMA standards (which promulgate requirements under Executive Order 11988 (Floodplain Management) and Executive Order 11990 (Protection of Wetlands)). Prohibits activities that adversely affect a federally-regulated wetland unless there is no practicable alternative and the proposed action includes all practicable measures to minimize harm to wetlands that may result from such use. Requires soliciting public comment on any disturbance of floodplains or federally-regulated wetlands.	During the remedial design stage the effects of sediment remedial actions on federal jurisdictional wetlands will be evaluated. All practicable means will be used to minimize harm to the wetlands. Wetlands disturbed by sediment remediation, monitoring, or other remedial activities will be mitigated in accordance with requirements. The site includes areas defined to be within the 100-year floodplain. Remedial actions that involve remedial activities in the floodplain areas will include all practicable means to minimize harm to and preserve beneficial values of floodplains. Floodplains disturbed by remedial actions will be restored to their original conditions and utility. Public comment regarding proposed impacts to wetlands and floodplains were solicited in the Proposed Plan. The comments received are addressed in the Responsiveness Summary for this ROD.

TABLE L-3b. LOCATION-SPECIFIC ARARS, CRITERIA, ADVISORIES, AND GUIDANCE FOR ALTERNATIVE SD-4: SOURCE CONTROL - EXCAVATION (B&M POND) WITH DISPOSAL

Authority	Requirements	Status	Requirement Synopsis	Applicability To Site Conditions
	Clean Water Act, Section 404 (33 U.S.C.. § 1344);Section 404(b)(1) Guidelines for Specification of Disposal Sites for Dredged or Fill Material (40 C.F.R. Part 230, 231 and 33 C.F.R. Parts 320-323)	Applicable	Under this requirement, no activity that adversely affects a wetland shall be permitted if a practicable alternative with lesser effects is available. Controls discharges of dredged or fill material to protect aquatic ecosystems. Under these standards EPA solicited public comment through the Proposed Plan on its finding that one of the alternatives is the Least Environmentally Damaging Practicable Alternative.	Sediment remediation, monitoring or other remedial actions that include dredging or filling in wetlands will be implemented to meet these requirements. EPA solicited public comment in the Proposed Plan as to its finding that the selected alternative was the Least Environmentally Damaging Practicable Alternative to protect wetland resouces at the Site. Public comments received regarding this finding were addressed in the Responsiveness Summary for this ROD.
State ARARs	Wetlands Protection Act (Mass. Gen. Laws ch. 131, §40); Wetlands Protection Regulations (310 CMR §10.00)	Applicable	Sets performance standards for dredging, filling, altering of inland wetland resource areas and sets buffer zones within 100 feet of a vegetated wetland and 200 feet from a perennial stream. The standards include mitigation requirements for alteration of regulated wetland resource areas. Resource areas at the site covered by the regulations include banks, bordering vegetated wetlands, land under bodies of water, land subject to flooding, and riverfront.	The site includes state regulated wetland resource areas. Alternatives requiring that work be completed within 100 feet of a state regulated wetland or 200 feet of a perennial waterway, will comply with these regulations. Mitigation of impacts on State wetland resource areas will be addressed.

TABLE L-3b. LOCATION-SPECIFIC ARARS, CRITERIA, ADVISORIES, AND GUIDANCE FOR ALTERNATIVE SD-4: SOURCE CONTROL - EXCAVATION (B&M POND) WITH DISPOSAL

Authority	Requirements	Status	Requirement Synopsis	Applicability To Site Conditions
Archaeological/Historic Sites				
Federal ARARs	National Historic Preservation Act of 1966 (16 U.S.C. §470 et seq.); Protection of Historic Properties (36 CFR part 800)	Applicable	Section 106 of the NHPA requires federal agencies to take into account the effects of their undertakings on historic properties and afford the Advisory Council on Historic Preservation a reasonable opportunity to comment.	Actions which may impact historical properties for which these requirements apply (such as the Middlesex Canal), must be coordinated with the Advisory Council on Historic Preservation.
	Historic Sites Act of 1935 (16 U.S.C. §469 et seq.); National historic landmarks (36 CFR Part 65)	Applicable	The purpose of the National Historic Landmarks program is to identify and designate National Historic Landmarks, and encourage the long range preservation of nationally significant properties that illustrate or commemorate the history and prehistory of the United States.	Actions which may impact historical properties for which these requirements apply (such as the Middlesex Canal), must be coordinated with the Department of the Interior.
State ARARs	Antiquities Act and Regulations (Mass. Gen. Laws. ch. 9, §§26-27; Massachusetts Historical Commission (Mass. Regs. Code tit. 950, §70.00); Antiquities Act and Regulations (Mass.Gen.Laws. ch. 9, §§26-27; Protection of Properties Included in the State Register of Historic Places (950 CMR §71.00)	Relevant and Appropriate	Projects which are state-funded or state-licensed or which are on state property must eliminate, minimize, or mitigate adverse effects to properties listed in the register of historic places. Establishes requirements for review of impacts for state-funded or state-licensed projects and projects on state-owned property. Establishes state register of historic places. Establishes coordination with the National Historic Preservation Act.	Actions which may impact the historical, architectural, archaeological, or cultural qualities of a property, whether listed or not, must be coordinated with the Massachusetts Historical Commission.

TABLE L-3c. ACTION-SPECIFIC ARARS, CRITERIA, ADVISORIES, AND GUIDANCE FOR ALTERNATIVE SD-4: SOURCE CONTROL - EXCAVATION (B&M POND) WITH DISPOSAL

Authority	Requirement	Status	Requirement Synopsis	Action to be Taken
Federal ARARs	RCRA - Standards Applicable to Generators of Hazardous Waste (40 CFR 262)	Applicable	Massachusetts is delegated to administer RCRA through its State regulations. Generator requirements outline waste characterization, management of containers, packaging, labeling, and manifesting. Generator requirements apply to contaminated substances meeting the definition of RCRA-hazardous under 40 CFR 261.	Contaminated media removed from the site will be tested under these standards to indentify if it exceed hazardous waste threshold standards. Any media exceeding threshold standards will be managed and disposed of in compliance with the delegated Massachusetts Hazardous Waste Regulations.
	Toxic Substances Control Act (TSCA); PCB Remediation Waste (40 C.F.R.761.61(c)	Applicable	This section of the TSCA regulations provides risk-based cleanup and disposal options for PCB remediation waste based on the risks posed by the concentrations at which the PCBs are found. Written approval for the proposed risk-based cleanup must be obtained from the Director, Office of Site Remediation and Restoration, U.S. Environmental Protection Agency (USEPA) Region 1.	All sediment exceeding identified PCB cleanup levels will be dredged, passively dewatered and either disposed of off-site or at an on-site OU3 landfill that meets TSCA protectiveness standards. The dredging, transportation/passive dewatering, and management of PCB contaminated sediment will be performed in a manner to comply with TSCA, including air and surface water monitoring during remedial activities. EPA has issued a finding by the Director, Office of Site Remediation and Restoration, EPA Region 1, that establishing a sediment PCB cleanup level at 1 ppm and the dredging, dewatering, and management of the contaminated sediment will not pose an unreasonable risk to human health or the environment.
	CWA National Recommended Water Quality Criteria (NRWQC) (40 CFR 122.44)	Relevant and Appropriate	Remedial actions involving contaminated surface water or groundwater must consider the uses of the water and the circumstances of the release or threatened release. Federal NRWQC are health-based and ecologically based criteria developed for carcinogenic and non-carcinogenic compounds..	Water quality standards will be used to assess Monitoried Natural Recovery of sediments. Will also be used for water quality monitoring during sediment excavation and any additional remedial work in or adjacent to wetlands/waterways.
	Toxic Pollutant Effluent Standards (40 CFR 129)	Applicable	Regulates surface water discharges of specific toxic pollutants, namely aldrin, dieldrin, DDT, endrin, toxaphene, benzidine, and PCBs.	Any water discharged to surface water bodies will meet the standards identified in this regulation.
	Clean Water Act - National Pollutant Discharge Elimination System (NPDES) (40 CFR Parts 122 and 125)	Applicable	Establishes the specifications for discharging pollutants from any point source into the waters of the U.S. Includes stormwater standards for activities disturbing more than one acre.	Any water discharged to surface water bodies will comply with this regulation. Best management practices will be used to meet stormwater standards during the remedial action, including the construction of stormwater contol.
	Clean Air Act, NAAQS (40 CFR 50.6 - 50.7)	To Be Considered	This regulation specifies maximum primary and secondary 24-hour concentrations for particulate matter.	If remedial activities include excavation, standards for particulate matter will be met during excavation and handling of contaminated sediments. Activities during construction will include measures to suppress dust.
Massachusetts ARARs	Massachusetts Clean Waters Act (Mass. Gen. Laws ch. 21, §§26-53); Water Quality Certification for Discharge of Dredged or Fill Material, Dredging, and Dredged Materials in Waters of the United States within the Commonwealth (314 CMR §9.00)	Applicable	Establishes criteria and standards for dredging, handling and disposal of fill material and dredged material.	The remedy represents the best practicable alternative for remediating contaminated sediments impairing aquatic resources within the Site. Any adverse impacts to water quality from the the dredging and transportation/passive dewatering of contaminated sediments will be addressed using best management practices, monitoring, and institutional controls.

TABLE L-3c. ACTION-SPECIFIC ARARS, CRITERIA, ADVISORIES, AND GUIDANCE FOR ALTERNATIVE SD-4: SOURCE CONTROL - EXCAVATION (B&M POND) WITH DISPOSAL

Authority	Requirement	Status	Requirement Synopsis	Action to be Taken
	Surface Water Quality Standards (27 M.G.L. 27; 314 C.M.R. 4.03, 4.04, and 4.05	Applicable	State surface water quality standards incorporate the federal NRWQC as standards for surface waters of the state. Standards establish acute and chronic effects on aquatic life for contaminants including PCBs, cadmium, chromium, copper, and lead.	Water quality standards will be used to assess Monitoried Natural Recovery of sediments. Will also be used for water quality monitoring during sediment excavation and any additional remedial work in or adjacent to wetlands/waterways.
	Hazardous Waste Management - Identification and Listing of Hazardous Wastes (21C M.G.L. 4 and 6, 310 C.M.R. 30.100)	Applicable	Massachusetts is delegated to administer RCRA through its State regulations. These standards establish requirements for determining whether wastes are hazardous based on either characteristics or listing.	Wastes generated as part of remedial activities that will be disposed of off-site (material excavated during mechanical dredging – including dewatering filters) will be characterized as hazardous or non-hazardous.
	Hazardous Waste Management - Requirements for Generators of Hazardous Waste (310 CMR 30.300)	Applicable	Generator requirements outline waste characterization, management of containers, packaging, labeling, and manifesting. Generator requirements apply to contaminated substances meeting the definition of hazardous under 310 CMR 100.	If removed from their location, substances meeting the definition of Massachusetts hazardous wastes must be handled, transported, and treated according to these rules.
	Air Pollution Control Regulations (310 CMR 7.00)	Applicable	Defines and regulates air pollution sources. Establishes emissions limitations for various processes and regions within the state. Sources require source approval and may require a study of health risks. All minor stationary sources are required to apply Best Available Control Technology (BACT) for each pollutant it would have the potential to emit. Major sources of volatile organic compounds (VOCs) are required to apply Lowest Achievable Emission Rate (LAER) and obtain offsets.	Any on-site treatment that generates an air emission source will comply with the substantive requirements of this regulation including: visible emissions, dust, noise, and VOC emission limitations. No air sources will cause ambient air quality standards to be exceeded.
	Ambient Air Quality Standards (310 CMR 6.00)	Applicable	Sets primary and secondary ambient air quality standards for emissions of sulfur oxides, particulate matter, CO, ozone, nitrogen dioxide, and lead.	Dust standards will be complied with during any and all excavation of materials at the site.
Federal Criteria, Advisories and Guidance	Contaminated Sediment Remediation Guidance for Hazardous Waste Sites (EPA-540-R-05-012 OSWER 9355.0-85 December 2005)	To Be Considered	Guidance for making remedy decisions for contaminated sediment sites.	This guidance will be considered in addressing contaminated sediments during the Monitored Natural Recovery of wetlands/wasterway that will not be excavated, as well as during mechanical dredging, dewatering, and disposal of the contaminated sediments.
	Generation of investigation derived waste USEPA OSWER Publication 9345.3-03 FS, January 1992	To Be Considered	Management of Investigation-Derived Waste (IDW) must ensure protection of human health and the environment.	IDW will be managed in a manner to protect human health and the environment.

TABLE L-3c. ACTION-SPECIFIC ARARS, CRITERIA, ADVISORIES, AND GUIDANCE FOR ALTERNATIVE SD-4: SOURCE CONTROL - EXCAVATION (B&M POND) WITH DISPOSAL

Authority	Requirement	Status	Requirement Synopsis	Action to be Taken
	ACGIH (American Conference of Governmental Industrial Hygienists) Threshold Limiting Values (TLVs)	To Be Considered	TLVs are an estimate of the average safe airborne concentration of a substance in representative conditions under which it is believed that nearly all workers may be repeatedly exposed day after day without adverse effect. These standards were issued as consensus standards for controlling air quality in work place environments.	TLVs could be used for assessing site inhalation risks for site remediation workers.
Massachusetts Criteria, Advisories, and Guidance	Erosion and Sediment Control Guidance	To Be Considered	Standards for preventing erosion and sedimentation .	Remedial actions will be managed to control erosion and sedimentation, particularly during the construction of stormwater controls with the Site.
	Massachusetts Water Quality Standards Implementation Policy of Toxic Pollutants in Surface Waters	To Be Considered	Recommends surface water quality standards for specified contaminants and implementation measures to achieve standards.	This implementation policy and appropriate standards will be considered when evaluation impacts to surface water quality from the remedy.
	Massachusetts Threshold Effects Exposure Levels (TELs) and Allowable Ambient Limits (AALs) for Air (December 1995)	To Be Considered	These are guidelines used by Massachusetts DEP for air emission permit writing. Under the Clean Air Act Amendments, AALs may be utilized. TELs and AALs provide guidance when assessing significance of monitored and modeled residential contamination from air emissions. They also are used in evaluating worker safety.	AALs and TELs are to be considered when evaluating worker safety during site remediation, and for ambient air quality monitoring during any site remedy that involves disturbance of waste or contaminated materials.
	Massachusetts Threshold Effects Exposure Levels (TELs) and Allowable Ambient Limits (AALs) for Air (December 1995)	To Be Considered	These are guidelines used by Massachusetts DEP for air emission permit writing. Under the Clean Air Act Amendments, AALs may be utilized. TELs and AALs provide guidance when assessing significance of monitored and modeled residential contamination from air emissions. They also are used in evaluating worker safety.	AALs and TELs are to be considered when evaluating worker safety during site remediation, and for ambient air quality monitoring during any site remedy that involves disturbance of waste or contaminated materials.

TABLE L-3d. CHEMICAL-SPECIFIC ARARS, CRITERIA, ADVISORIES, AND GUIDANCE FOR ALTERNATIVE GW-2: LIMITED ACTION

Authority	Requirement	Status	Requirement Synopsis	Action to be Taken
Federal Criteria, Advisories, and Guidance	EPA Risk Reference Dose (RfDs)	To Be Considered	RfDs are considered to be the levels unlikely to cause significant adverse health effects associated with a threshold mechanism of action in human exposure for a lifetime.	Hazards due to noncarcinogens with EPA RfDs will be addressed through groundwater use restrictions within the compliance zone for the waste management area and long-term monitoring to confirm contamination exceeding risk levels is not migrating beyond the compliance boundary. An additional buffer zone beyond the compliance boundary to prevent groundwater wells from being installed that would draw contaminated groundwater beyond the compliance boundary will also be established.
	EPA Carcinogenicity Slope Factor	To Be Considered	Slope factors are developed by EPA from health effects assessments. Carcinogenic effects present the most up-to-date information on cancer risk potency. Potency factors are developed by EPA from Health Effects Assessments of evaluation by the Carcinogenic Assessment Group.	Risks due to carcinogens as assessed with slope factors will be addressed through groundwater use restrictions within the compliance zone for the waste management area and long-term monitoring to confirm contamination exceeding risk levels is not migrating beyond the compliance boundary. An additional buffer zone beyond the compliance boundary to prevent groundwater wells from being installed that would draw contaminated groundwater beyond the compliance boundary will also be established.
	Guidelines for Carcinogen Risk Assessment EPA/630/P-03/001F (March 2005)	To Be Considered	Guidance for assessing cancer risk.	Hazards due to carcinogens will be addressed through groundwater use restrictions within the compliance zone for the waste management area and long-term monitoring to confirm contamination exceeding risk levels is not migrating beyond the compliance boundary. An additional buffer zone beyond the compliance boundary to prevent groundwater wells from being installed that would draw contaminated groundwater beyond the compliance boundary will also be established.
	Supplemental Guidance for Assessing Susceptibility from Early-Life Exposure to Carcinogens EPA/630/R-03/003F (March 2005)	To Be Considered	Guidance of assessing cancer risks to children.	Carcinogenic risks to children will be addressed through groundwater use restrictions within the compliance zone for the waste management area and long-term monitoring to confirm contamination exceeding risk levels is not migrating beyond the compliance boundary. An additional buffer zone beyond the compliance boundary to prevent groundwater wells from being installed that would draw contaminated groundwater beyond the compliance boundary will also be established.

TABLE L-3e. LOCATION-SPECIFIC ARARS, CRITERIA, ADVISORIES, AND GUIDANCE FOR ALTERNATIVE GW-2: LIMITED ACTION

Authority	Requirements	Status	Requirement Synopsis	Applicability To Site Conditions
Wetlands, Floodplains, Streams, or Water Bodies				
Federal ARARs	Fish and Wildlife Coordination Act (16 U.S.C. §661 *et seq*.)	Applicable	Any modification of a body of water requires consultation with the U.S. Fish and Wildlife Services and the appropriate state wildlife agency to develop measures to prevent, mitigate, or compensate for losses of fish and wildlife.	Installation of new monitoring wells and long-term O&M and sampling of wells could impact streams, wetlands, and downstream waterbodies. Planning and decision-making regarding the remedy will incorporate fish and wildlife protection considerations in consultation with federal and state resource agencies.
	Floodplain Management and Protection of Wetlands, 44 C.F.R. 9	Relevant and Appropriate	Remedial alternatives that may cause alteration within a 500-year floodplain/cause negative impacts to downstream floodplain or that will cause alteration of federal jurisdictional wetlands/aquatic habitats will be implemented in compliance with these relevant and appropriate FEMA standards (which promulgate requirements under Executive Order 11988 (Floodplain Management) and Executive Order 11990 (Protection of Wetlands)). Prohibits activities that adversely affect a federally-regulated wetland unless there is no practicable alternative and the proposed action includes all practicable measures to minimize harm to wetlands that may result from such use. Requires soliciting public comment on any disturbance of floodplains or federally-regulated wetlands.	During the remedial design stage the effects of well installation, O&M, and monitoring on federal jurisdictional wetlands will be evaluated. All practicable means will be used to minimize harm to the wetlands. Wetlands disturbed by remedial activities will be mitigated in accordance with requirements. The site includes areas defined to be within the 100-year floodplain. Remedial actions that involve remedial activities in the floodplain areas will include all practicable means to minimize harm to and preserve beneficial values of floodplains. Floodplains disturbed by remedial actions will be restored to their original conditions and utility. Public comment regarding proposed impacts to wetlands and floodplains were solicited in the Proposed Plan. The comments received are addressed in the Responsiveness Summary for this ROD.

TABLE L-3e. LOCATION-SPECIFIC ARARS, CRITERIA, ADVISORIES, AND GUIDANCE FOR ALTERNATIVE GW-2: LIMITED ACTION

Authority	Requirements	Status	Requirement Synopsis	Applicability To Site Conditions
	Clean Water Act, Section 404 (33 U.S.C.. § 1344);Section 404(b)(1) Guidelines for Specification of Disposal Sites for Dredged or Fill Material (40 C.F.R. Part 230, 231 and 33 C.F.R. Parts 320-323)	Applicable	Under this requirement, no activity that adversely affects a wetland shall be permitted if a practicable alternative with lesser effects is available. Controls discharges of dredged or fill material to protect aquatic ecosystems. Under these standards EPA solicited public comment through the Proposed Plan on its finding that one of the alternatives is the Least Environmentally Damaging Practicable Alternative.	Sediment remediation, monitoring or other remedial actions that include dredging or filling in wetlands will be implemented to meet these requirements. EPA solicited public comment in the Proposed Plan as to its finding that the selected alternative was the Least Environmentally Damaging Practicable Alternative to protect wetland resouces at the Site. Public comments received regarding this finding were addressed in the Responsiveness Summary for this ROD.
State ARARs	Wetlands Protection Act (Mass. Gen. Laws ch. 131, §40); Wetlands Protection Regulations (310 CMR §10.00)	Applicable	Sets performance standards for dredging, filling, altering of inland wetland resource areas and sets buffer zones within 100 feet of a vegetated wetland and 200 feet from a perennial stream. The standards include mitigation requirements for alteration of regulated wetland resource areas. Resource areas at the site covered by the regulations include banks, bordering vegetated wetlands, land under bodies of water, land subject to flooding, and riverfront.	The site includes state regulated wetland resource areas. Alternatives requiring that work be completed within 100 feet of a state regulated wetland or 200 feet of a perennial waterway, will comply with these regulations. Mitigation of impacts on State wetland resource areas will be addressed.

TABLE L-3e. LOCATION-SPECIFIC ARARS, CRITERIA, ADVISORIES, AND GUIDANCE FOR ALTERNATIVE GW-2: LIMITED ACTION

Authority	Requirements	Status	Requirement Synopsis	Applicability To Site Conditions
Archaeological/Historic Sites				
Federal ARARs	National Historic Preservation Act of 1966 (16 U.S.C. §470 et seq.); Protection of Historic Properties (36 CFR part 800)	Applicable	Section 106 of the NHPA requires federal agencies to take into account the effects of their undertakings on historic properties and afford the Advisory Council on Historic Preservation a reasonable opportunity to comment.	Actions which may impact historical properties for which these requirements apply (such as the Middlesex Canal), must be coordinated with the Advisory Council on Historic Preservation.
	Historic Sites Act of 1935 (16 U.S.C. §469 et seq.); National historic landmarks (36 CFR Part 65)	Applicable	The purpose of the National Historic Landmarks program is to identify and designate National Historic Landmarks, and encourage the long range preservation of nationally significant properties that illustrate or commemorate the history and prehistory of the United States.	Actions which may impact historical properties for which these requirements apply (such as the Middlesex Canal), must be coordinated with the Department of the Interior.
State ARARs	Antiquities Act and Regulations (Mass. Gen. Laws. ch. 9, §§26-27; Massachusetts Historical Commission (Mass. Regs. Code tit. 950, §70.00); Antiquities Act and Regulations (Mass.Gen.Laws. ch. 9, §§26-27; Protection of Properties Included in the State Register of Historic Places (950 CMR §71.00)	Relevant and Appropriate	Projects which are state-funded or state-licensed or which are on state property must eliminate, minimize, or mitigate adverse effects to properties listed in the register of historic places. Establishes requirements for review of impacts for state-funded or state-licensed projects and projects on state-owned property. Establishes state register of historic places. Establishes coordination with the National Historic Preservation Act.	Actions which may impact the historical, architectural, archaeological, or cultural qualities of a property, whether listed or not, must be coordinated with the Massachusetts Historical Commission.

TABLE L-3f. ACTION-SPECIFIC ARARS, CRITERIA, ADVISORIES, AND GUIDANCE FOR ALTERNATIVE GW-2: LIMITED ACTION

Authority	Requirement	Status	Requirement Synopsis	Action to be Taken
Federal ARARs	Safe Drinking Water Act (42 U.S.C. §300f *et seq.*); National primary drinking water regulations (40 C.F.R. 141, Subparts B and G)	Relevant and Appropriate	Establishes MCLs for common organic and inorganic contaminants applicable to public drinking water supplies. Used as relevant and appropriate standards for aquifers and surface water bodies that are potential drinking water sources.	Groundwater outside of the compliance boundary for the waste management area established at the Site currently meets these standards. Groundwater monitoring using these standards will be used to make sure groundwater exceeding these standards does not migrate beyond the compliance boundary. Exceedances of these standards within the compliance boundary is a basis for establishing prohibitions on the use of groundwater within the compliance boundary. An additional buffer zone beyond the compliance boundary to prevent groundwater wells from being installed that would draw contaminated groundwater beyond the compliance boundary will also be established.
	Safe Drinking Water Act (42 U.S.C. §300f *et seq.*); National primary drinking water regulations (40 C.F.R. 141, Subpart F)	Relevant and Appropriate for non-zero MCLGs only; MCLGs set as zero are To Be Considered.	Establishes maximum contaminant level goals (MCLGs) for public water supplies. MCLGs are health goals for drinking water sources. These unenforceable health goals are available for a number of organic and inorganic compounds.	Groundwater outside of the compliance boundary for the waste management area established at the Site currently meets these standards. Groundwater monitoring using these standards will be used to make sure groundwater exceeding these standards does not migrate beyond the compliance boundary. Exceedances of these standards within the compliance boundary is a basis for establishing prohibitions on the use of groundwater within the compliance boundary. An additional buffer zone beyond the compliance boundary to prevent groundwater wells from being established that would draw contaminated groundwater beyond the compliance boundary will also be established.
	Clean Water Act - National Pollutant Discharge Elimination System (NPDES) (40 CFR Parts 122 and 125)	Applicable	Establishes the specifications for discharging pollutants from any point source into the waters of the U.S. Includes stormwater standards for activities disturbing more than one acre.	Any water discharged to surface water bodies during well installation or O&M will comply with this regulation. Best management practices will be used to meet stormwater standards during the remedial action.
Massachusetts ARARs	Massachusetts Hazardous Waste Rules - Groundwater protection (310 CMR 30.660)	Relevant and Appropriate	Hazardous waste facility standards for the protection of groundwater. Groundwater standards must be met beyond a point of compliance (310 CMR 669)	A "waste management area compliance zone" for groundwater will be established for the Site within which institutional controls will prohibit the use of groundwater. Federal and state drinking water standards do not have to be met within the compliance zone. Groundwater outside of the compliance zone currently meets and must continue to meet federal and state drinking water standards. An additional buffer zone beyond the compliance boundary to prevent groundwater wells from being installed that would draw contaminated groundwater beyond the compliance boundary will also be established.
	Massachusetts Solid Waste Rules - Groundwater Monitoring (310 CMR 118	Relevant and Appropriate	Solid waste facility standards for monitoring groundwater.	Monitoring wells to be installed within 150 meters of the compliance boundary or at the property boundary, whichever is less, and located hydraulically downgradient from the compliance boundary and capable of detecting groundwater contaminants that migrate from the compliance zone.

TABLE L-3f. ACTION-SPECIFIC ARARS, CRITERIA, ADVISORIES, AND GUIDANCE FOR ALTERNATIVE GW-2: LIMITED ACTION

Authority	Requirement	Status	Requirement Synopsis	Action to be Taken
	Massachusetts Drinking Water Regulations (310 CMR §22.00)	Applicable	Establishes maximum contaminant levels that apply to public drinking water supplies. Massachusetts Maximum Contaminant Levels and Maximum Contaminant Level Goals are specified for numerous contaminants, including inorganic and organic chemicals. For the most part, the numerical criteria are identical to Federal SDWA MCLs and MCLGs, although there are several additional chemicals that have criteria.	Groundwater outside of the compliance boundary for the waste management area established at the Site currently meets these standards. Groundwater monitoring using these standards will be used to make sure groundwater exceeding these standards does not migrate beyond the compliance boundary. Exceedances of these standards within the compliance boundary is a basis for establishing prohibitions on the use of groundwater within the compliance boundary. An additional buffer zone beyond the compliance boundary to prevent groundwater wells from being established that would draw contaminated groundwater beyond the compliance boundary will also be established.
	Surface Water Discharge Permit Program (314 CMR 3.00)	Applicable	This program regulates discharges of pollutants to surface waters in the Commonwealth. The program also regulates the outlets for such discharges and any treatment works associated with these discharges.	Any water discharged to surface water bodies during installation or O&M of monitoring wells will meet the standards identified in this regulation.
Federal Criteria, Advisories, and Guidance	Generation of investigation derived waste USEPA OSWER Publication 9345.3-03 FS, January 1992	To Be Considered	Management of Investigation-Derived Waste (IDW) must ensure protection of human health and the environment.	IDW will be managed in a manner to protect human health and the environment.
	Health Advisories (EPA Office of Drinking Water)	To Be Considered	Health Advisories are estimates of risk due to consumption of contaminated drinking water; they consider non-carcinogenic effects only. To be considered for contaminants in groundwater that may be used for drinking water	Groundwater outside of the compliance boundary for the waste management area established at the Site currently meets these standards. Groundwater monitoring using these standards will be used to make sure groundwater exceeding these standards does not migrate beyond the compliance boundary. Exceedances of these standards within the compliance boundary is a basis for establishing prohibitions on the use of groundwater within the compliance boundary. An additional buffer zone beyond the compliance boundary to prevent groundwater wells from being established that would draw contaminated groundwater beyond the compliance boundary will also be established.
	EPA Groundwater Protection Strategy (August 1984; NCP Preamble, Vol 55, No. 46, March 8, 1990, 40 CFR Part 300, p. 8733); Guidelines for Ground-Water Classification (November 1986)	To Be Considered	The Groundwater Protection Strategy provides a common reference for preserving clean groundwater and protecting the public health against the effects of past contamination. Guidelines for consistency in groundwater protection programs focus on the highest beneficial use of a groundwater aquifer and define three classes of groundwater. These documents defined Class I, II and III groundwaters.	Groundwater outside of the compliance boundary for the waste management area established at the Site currently meets these standards. Groundwater monitoring using these standards will be used to make sure groundwater exceeding these standards does not migrate beyond the compliance boundary. Exceedances of these standards within the compliance boundary is a basis for establishing prohibitions on the use of groundwater within the compliance boundary. An additional buffer zone beyond the compliance boundary to prevent groundwater wells from being installed that would draw contaminated groundwater beyond the compliance boundary will also be established.

TABLE L-3f. ACTION-SPECIFIC ARARS, CRITERIA, ADVISORIES, AND GUIDANCE FOR ALTERNATIVE GW-2: LIMITED ACTION

Authority	Requirement	Status	Requirement Synopsis	Action to be Taken
Massachusetts Criteria, Advisories, and Guidance	Erosion and Sediment Control Guidance	To Be Considered	Standards for preventing erosion and sedimentation .	Remedial actions will be managed to control erosion and sedimentation.
	Massachusetts Office of Research and Standards Guidelines	To Be Considered	DEP Health Advisories are guidance criteria for drinking water. The DEP Office of Research and Standards issues guidelines for chemicals for which state MCLs have not been promulgated. These guidelines apply to non-chlorinated water supplies and represent a level at or below which adverse, non-cancer health effects are not expected to occur and which generally has an excess lifetime cancer risk of less than or equal to 10^{-6}.	Groundwater outside of the compliance boundary for the waste management area established at the Site currently meets these standards. Groundwater monitoring using these standards will be used to make sure groundwater exceeding these standards does not migrate beyond the compliance boundary. Exceedances of these standards within the compliance boundary is a basis for establishing prohibitions on the use of groundwater within the compliance boundary. An additional buffer zone beyond the compliance boundary to prevent groundwater wells from being installed that would draw contaminated groundwater beyond the compliance boundary will also be established.

Appendix E

Public Hearing Transcript

UNITED STATES OF AMERICA

ENVIRONMENTAL PROTECTION AGENCY

BOSTON REGION

In the Matter of:

PUBLIC HEARING:

RE: PROPOSED CLEAN-UP PLAN FOR OPERABLE UNIT 4 AT THE IRON HORSE PARK SUPERFUND SITE

Billerica Town Hall
365 Boston Road
Billerica, Massachusetts

Tuesday
November 9, 2010

The above entitled matter came on for hearing, pursuant to Notice at 7:45 p.m.

BEFORE:

ROBERT CIANCIARULO, Chief
Massachusetts Superfund Section
DON MCELROY, Remedial Project Manager
STACEY GREENDLINGER
EPA, Region 1
5 Post Office Square, Suite 100
Boston, MA 02109-3912

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P R O C E E D I N G S

(7:46 p.m.)

HEARING OFFICER CIANCIARULO: Good evening. My name is Bob Cianciarulo. I am Chief of EPA's Massachusetts Superfund Section of Boston. I will be the hearing officer for tonight's hearing on the clean up plan for Operable Unit 4 at the Iron Horse Park Superfund Site, Billerica, Massachusetts. Operable Unit 4 addresses sediment and groundwater at the site.

The purpose of this hearing is to formally accept oral comments regarding EPA's proposed plan that was released to the public last month. The comment period was set to run until November 24th. Earlier this evening, we did receive a request for an extension to that comment period.

Tonight, we are announcing that we will extend that comment period, which a 30 day extension would have brought us to December 23rd. So, we will extend it until January the 3rd. So, you have until January the 3rd to provide written comments on the plan. And I'll get into that in more detail as we move on.

Today, again is to provide oral comments for the record.

A public information meeting was held here in Billerica on October 27th. At that meeting, information concerning the proposed plan was presented to the public and EPA responded to questions. At that time, EPA also provided the proposed plan and supporting information in the administrative record that was put on file at our record center in Boston and at the Billerica library. That marked the start of the comment period.

There was also an informal session here this evening before we started this hearing where the public had an opportunity to ask questions and receive clarifications.

For the record, the proposed plan involves excavating approximately 7400 cubic yards of contaminated sediment from B&M Pond, disposing of that sediment either on site or off site and restoring impacted wetlands. It also includes monitored natural recovery of the Unnamed Brook sediments and associated wetlands, and implementing storm water runoff controls to prevent sediment recontamination.

The plan also includes monitoring groundwater to ensure that contamination doesn't move off of site boundary.

It includes land use and groundwater use restrictions, and periodic five year reviews.

In the feasibility study that is included in the administrative record, these are called alternatives GW-2 and SD-4.

The total estimated cost of the proposed remedy is 5.4 million.

As most of you noticed, there was copies of the proposed plan at the back of the room.

When you came in, we asked people to indicate their desire to make an oral comment. I'm going to read from the names on that list in the order people signed up. Once all of those names are read, we'll sort of open things up for other people that would like to make a comment on the record.

Again, there is -- this is just one method of commenting. You can certainly comment in writing. The methods -- the ways you can comment, by e-mail or fax or US mail are shown in the proposed plan.

After all the comments are heard, I will close the formal hearing. And then, if you have any other questions at the close of the hearing, you can ask any of the EPA representatives here for more information on how to submit a comment.

We are not going to respond to your comments here at the hearing. This sometimes is a frustrating process for the public. We will sit here and listen to your comments, but our response will be to thank you for your input. And we do appreciate your input and value your opinion on our proposal.

Are there any questions on the format of the hearing?

Hearing none, I will begin the formal hearing.

The first speaker, Richard Karamanian.

MR. KARAMANIAN: Richard Karamanian, Ashdale Road.

We've gone through various questions that were asked, and at this point, it's open for comments, so I will be making comments then.

In comparison to SD-4, SD-6, an analogy if I could. If a cancer patient went under surgery to remove a tumor, one of the biggest fears for that patient would be was all of it removed, was all of the cancer removed, will it return.

That's the comparison I am making with SD-4 to SD-6. If you go through the SD-4 plan, the back of our minds, the residents are always going to wonder, if it's clean, if it's still there.

If this was the big three auto manufacturers going before the Senate asking for a bail out, which they did get, we've been waiting over 26 years. And now we are asked to wait an additional 20 some odd years. We would like to see our bailout that we did not create.

Thank you.

HEARING OFFICER CIANCIARULO: Mark Sampson.

MR. SAMPSON: Thank you. Thank you for coming this evening to present to us.

I have a handful of comments or so. The first is, the differences between SD-4 and SD-6 are really immaterial in the grand scheme of things. The biggest pieces, for certainly me and my young family, are the fact that, there is a 15 year differential between SD-4 and SD-6 per the document that we've all received.

In my opinion, and I'm not a tree or an environmental expert, those 15 years are more than enough time to replant vegetation and trees, or whatever needs to be done to rectify the invasive nature of SD-6 versus SD-4. And in the grand scheme of things, the million dollar difference between SD-6 and SD-4 is really, really, really small.

According to the EPA website in the 2009 fiscal year summary, the EPA obligated more than $1.1 billion for various cleanup activities. Our million dollar difference that we're talking about here is less than 1/10 of 1 percent.

So, I'd really like the EPA to give significant consideration to SD-6 when they review this.

Additionally, we'd like the sediment to be moved off site. I understand, from reading the document, that there is a potential to cap the sediment with the OU-3 processes that are underway. However, Billerica has had this sediment and various pollutants in Iron Horse Park for 27 years, easily pushing 30. We are talking about another

10 years, probably, before this is even close to being done.

To get the sediment off site would be the ideal situation. And if it doesn't go off site, to make sure that we have a clay base for the sediment to be able to avoid any chemicals going back into the ground.

One point of administrative minutia, if you will, there is some inconsistency in the feasibility study between two of the figures. On Table 3.2 that summarizes the sediment alternatives, SD-6 does not mention five year reviews to evaluate remedy as a component.

However, Table 4.6 or 4-6 does show it as a disadvantage/cost. So, I wanted to point that out to the EPA.

My home is about eight -- seven or eight houses from the boundary line in the northern part of Iron Horse Park. And I want to make sure it is duly noted that there is no fencing. There is no obstruction. I can walk right into the B&M Pond which is one of the areas that are being proposed to be cleaned out.

I'm not sure if that is in EPA's plans to go ahead and protect children especially. Adults should know better than to go in. But children, especially, from entering that part of Iron Horse Park. Actually, all of Iron Horse Park that is not currently with a business on it, ought to be fenced.

I'd also like to note the fact, I know of abutters that live very close to Iron Horse Park that have well water. And I'd like to understand the consideration that the EPA will give to them, concerns -- you know, concerning the well water that they are drinking.

A couple of final points. At the last public meeting, the one that was prior to the comment period, someone had commented to the fact that we are almost there, because we are on OU-4. I just want to make note that OU-4 wasn't even thought of until the 2008 five year review. And by 2008, it was already 24 years into this cleanup. There's really nothing to say, that EPA won't add OU-5, 6, 12, at some point in the future.

It goes back to my initial point which is, we're keen to get this done in five years, rather than 20, in case it's going to be another five year plan that has to happen after that.

Two final points, if I could. I'm not a scientist. And I think, this goes back to one of the questions that was asked just before this, but I can't understand how monitored natural resources for recovery can handle, what I assume, are metals that are actually in the sediment. The package actually mentions things that I believe are metal, because I did have a little bit of science in school, copper, lead, and that other things like chromium and vanadium and zinc.

So, I don't understand how natural monitored -- monitored natural recovery will address those things.

And then, finally, I do appreciate the extension of time for the comment period. However, I'd like to go on the record and ask for a little bit further consideration in terms of the fact that there are major holidays between now and January 3rd that take people away from families and away from the area. So, it takes their mind off of the task at hand, which is a big one still, for residents to make more informed comments to this proposed action.

Thank you.

HEARING OFFICER CIANCIARULO: The next speaker is Jack Porell.

MR. PORELL: Good evening. Jack Porell, 4 High Street.

Based on the comments that were made at the prior meeting earlier of this meeting, I too am in favor of SD-6. I think we have all been through this long enough. I think it's time we made a finite plan to remedy the situation as best we can, given the resources. And I also am in favor, I want on the record, of off site disposal of these sediments. I think, in terms of us living with this long enough and deciding to truck it off.

And I hope, moving forward, as we arrange a plan, that the EPA will be willing to work with neighboring residents to the area in terms of the impact the clean up has as it goes on.

I made a comment last time in terms of traffic in the neighborhood. And I hope that all avenues will be considered in terms of truck traffic and things like that that are involved in the project.

Thank you.

HEARING OFFICER CIANCIARULO: Thank you.

The next speaker is Ed Camplese.

MR. CAMPLESE: I would like to present a few concerns.

HEARING OFFICER CIANCIARULO: Could you just give us your name and address for the record?

MR. CAMPLESE: Oh, Ed Camplese, 22 New Foster Ave, Billerica.

I'd like to express a few concerns relating to the extent that the clean up should be to the Iron Horse Park area.

This year alone, we had extreme flooding in the Billerica area. And there were extreme driving issues.

My concern addresses a lot of the compounds listed by the EPA and especially with regard to the Unnamed Brook when talking about SD-6. In terms of -- my concerns are regarding (inaudible) which would carry those contaminants to the areas of concern.

When I was reviewing some of the reports, one of them was a draft final feasibility study. I think it was in Section 3, this is around page 3-9, speaks about (inaudible). And it makes a suggestion in there, (inaudible) suggests there is a slip that appears to flow towards the site on High Street, towards the Concord River and towards the culvert that is now on the site.

The terminology being suggests regional waterway divide does not accurately define the dividers and where we've had the pollutants we've discussed in that area. So that's one my concerns on that.

The other one comes down to the -- again, back to the chemical compounds. And I was reviewing the various chemical compounds listed, further investigating the risks of long and short term exposure to these chemicals. These chemicals were listed as significant risk contributors in your documentation. I will go further and submit more detailed written comments and ask that you take into consideration in seeing what channel to take on them.

The other one goes back to, again, I think, we've established that the metals and the PCB's don't react similarly down the materials which oxidize and degrade on their own. So, I'm requesting the SD-6 instead of the SD-4, especially now with the Unnamed Brook.

I feel it's not unreasonable at all to request the SD-6. The additional expense for restoration of the wetlands in order to perform (inaudible), as the other gentleman has referenced, outweighs prolonging the risks to the health and environment of the area.

And one other comment, basically, as far as extending the comment period, we appreciate it. The other consideration should be the holidays, if it would be possible to give an additional two weeks onto the January 3rd dead line. That would help the EPA to get more additional records, before you file comments. Probably have a case for both -- both of us.

Thank you.

HEARING OFFICER CIANCIARULO: Okay. The next speaker, Caroline Ahdab.

MS. AHDAB: Caroline Ahdab, I am a long time resident of Billerica. And I am here because it's my home town. I love it. And I'd really like to see this site cleaned up.

I want to express my preference to option SD-6, the excavation of the B&M Pond, the removal of sediment on Unnamed Brook and the wetlands.

As I was reviewing some of the documents on line, I noticed the initial remedial investigation document, Section 3. The culvert was still in, and that was what created Unnamed Brook.

And my concern is that, if we don't remove the sediment and the surrounding materials for the wetland, that we'll end up with issues along the road, just simply monitoring them. And I believe that removal of the wetlands in that area, the sediments along that Unnamed Brook is the best option.

I'd also like to make a request to have -- to include additional groundwater monitoring for an additional five or 10 years past the option SD-6. And the reason I am requesting this additional groundwater monitoring is, we now know of things that are of public health concern, certain chemicals, certain levels of exposure. And to have this groundwater monitoring say five or 10 years past the proposed clean up, will then give the public the assurance and confidence that the site has been cleaned up and there is nothing flowing to the Merrimack River, which does affect other populations and I believe, Tewksbury also drinks from the Merrimack River.

So, I do -- again, I would like to request that monitoring of the groundwater or, you know, the best -- for the best of the public health and the environment.

Thank you.

HEARING OFFICER CIANCIARULO: Thank you.

All right. The next speaker, Taryn Hallweaver.

MS. HALLWEAVER: Hi, everybody. My name is Taryn Hallweaver. And I'm a community organizer with Toxics Action Center.

Toxics Action Center is a public health and environmental nonprofit. And we work side by side with residents to clean up and correct pollution.

Thank you for the chance to comment tonight. And I'm going to keep my comments relatively generalized, because we will be submitting more thorough written comments before the comment period is up.

So, just a little bit of background and history on our involvement. We got our start after the dramatic incident in Woburn, when, in the late '70s, more than a dozen children and teenagers died of leukemia after their pregnant mothers had drunken contaminated public water when W.R. Grace Company had buried barrels of TCE and other chemicals right into the ground.

Since then, since 1987, we have worked with over 650 groups across New England to clean up and prevent pollution. And unfortunately, even though a lot of people, maybe not folks in this room, but a lot of other people think that incidents like Woburn are stories of the past, the fact is that, we still have a very long way to go to clean up hazardous waste sites.

There are over 10,000 hazardous waste sites across

New England. And here in Massachusetts, more than a third of towns that are home to these sites have lost part or all of their drinking water supply to toxic contamination. And across the board, these sites are the result of irresponsible, illegal handling of toxic chemicals, more than a century long history of this.

Now, just thinking about time, the longer the hazardous waste, such as voltaic (phonetic) compounds or PCBs remain in the ground, the further it is going to spread. And these chemicals persist in our environment for decades, if not much longer, and both environment degradation and the cost of cleanup rise dramatically as the clean up is completed.

Hazardous waste sites pollute rivers, bodies of water, drinking supplies and threaten the health and safety of nearby neighbors. And as, unfortunately, some folks can testify to here in Billerica, the experience of living in a home or in a neighborhood that has been contaminated, not only disrupts one's life, you know, as we know it, but it can also have serious psychological and physical problems as well.

Now, thinking about costs, the cost for cleaning up hazardous waste sites, especially one as large and complex as the Iron Horse site can be great. And in our experience, polluters will go to great lengths to avoid responsibility for their messes. Polluters will try to get out of the responsibility of paying for the clean up or convince citizens they should go after State money. And at the Federal level, polluters have successfully rolled back the tax on toxic chemicals, effectively, drying up the Superfund.

And then, in the particular case of the Iron Horse Park clean up plan, one red flag when it comes to cost and time really stands out. And that red flag is the fact that EPA's preferred plan costs just over $1 million, plus the plan takes 20 years to complete, 15 years longer.

Cleanups are expensive. And it seems to me that, $1 million doesn't make a measurable difference in when you consider the time difference. Residents of Billerica have waited long enough. The Iron Horse Park Superfund site has been listed by the Federal Government as a hazardous waste site since 1984. As Mark mentioned, the current upgrading needed under discussion, groundwater and sediment wasn't even in the playing field until 2008.

Now, in addition to the time and cost discrepancies, a couple of other notes. One is that, as somebody mentioned while organic materials will degrade over time, metals and PCBs will not. I notice in the plan that there is a plan to reduce PCB levels, but not entirely remove them. So, I'm wondering what that plan is.

And then, the second is a note on the Wetland Conservation Act, (inaudible) EPA's preferred plan. It seems to me, that the major difference is, in an effort to minimally disturb the wetlands, allow for natural degradation of chemicals. You know, I love good wetlands as much as anybody else. I come from an environmental background. But, we are not talking about a pristine park. We are talking about a Superfund site.

And the safety of people's health, their drinking water, for the folks who live in Billerica is a trump card over the wetlands in any case.

So, that is all for now. Thank you for the chance to comment. We will be submitting written comments as well.

HEARING OFFICER CIANCIARULO: Thank you.

That is the end of the list of people I had who had signed up initially.

So, I guess, we will just sort of take people as they come.

I think that gentleman all the way in the back was the first to raise his hand.

And we will stay as long as we need to to make sure everyone gets heard.

MR. BROWN: Good evening. Derrick Brown, 81 Rogers Street. And I am also in support of the SD-6 cleanup program for pretty much every reason that has been given here tonight. We are all here and listening every day, all of the media and agreeing. Not one person in this room has mentioned what's happened to the pond life as a result of this. And a five year cleanup plan, versus an additional 15 years. And I know migratory birds land on that pond. I know there is amphibians in that pond. And I'd rather have a five-year program and get that the heck out of here than wait another 15 years and not measure where that wildlife goes that impacts way beyond Billerica.

That's all I have to say.

THE REPORTER: And one more time, could you repeat your name please?

MR. BROWN: Derrick Brown, 81 Rogers Street, North Billerica.

So, it is much further reaching than Billerica.

MS. SANTOS: Lynne Santos, 29 Seven Oaks Road.

I think that everyone has already made the same comments that I planned to make. I would like EPA to choose SD-6 option. I think it would be better to remove all the contaminated sediments. I'm skeptical that metals and PCBs can be treated with natural recovery, because, from what I understand, it won't be oxidized or changed. They would just stay there and be buried. And I would prefer to see them moved off site.

And I think that would be more protective of the groundwater, because, you will be taking away a source of possible contamination to the groundwater.

And Caroline mentioned having the groundwater monitored longer. And I think that's a great idea.

Also, because, levels that we consider safe are always changing. And so, what we consider safe now might not be safe in 10 years. So, that the agency should monitor longer.

And I also wanted to add to that that I would like to see some plans for testing for vapor intrusion for volatile organics in the houses immediately next to the Superfund. I think that would be important and it would make the residents feel safer to know that the chemicals are not seeping into their basements and allowing them to breathe in the cancer causing chemicals.

And I think that's it for me.

MR. JOHNSON: David Johnson. I'm at 113 Gray Street, Billerica.

I have written this out, because I can't give it so easily. The final phase of the Iron Horse Park Superfund Site cleanup activities presents the last opportunity to ensure that the neighbors of the site are provided adequate safeguards from off site migration of polluting the groundwater.

The EPA's hydraulic evaluation of the site, describes an over burden that is very conducive to quickly expanding movements of the groundwater. The groundwater moving very quick, it's sand and gravel. It has been shown that surface water discharges raise the natural level of the groundwater for the overburdened aquifer creating mounding effects. And in doing so, when there is a mounding effect of water in the aquifer, it's difficult to determine which way that water is going to go. It's not with the normal flow that the groundwater normally goes in.

So, it's difficult to predict that and detect it. Thus, the harm to -- thus, the mounding creates groundwater movements in all directions, not necessarily predictable ones.

The groundwater movement, of course, transports the contaminants that are there. Harmful contaminants have been measured in the overburdened aquifer for groundwater and in the surface water being discharged into the aquifer.

Therefore, removing the sediment from the wetland area addressed in this plan opens the direct unfiltered pathway for contaminated surface water to interact with the contaminated groundwater, resulting in contaminated groundwater migration to unintended off site sediment.

As part of the cleanup, I believe it would be prudent to identify all private wells that are surrounding the overburdened aquifer and associated bedrock aquifers, to alert the owners of these wells, of the potential hazards and risks associated with the use of these wells, and provide Town water hookups at no expense to those who want them.

Additionally, when reconstructing the wetlands area, line the entire area with an impervious layer, with adequate ports to control surface water discharge to the groundwater and thus, nipping the offsite transport of the harmful contaminants.

That's about it. And SD-6 does the chore of an SD-4, except the issue of Town hookup of water to those who are using wells.

Thank you.

MR. STANTON: Bob Stanton, White Gate Road.

Again, I too would like to see the SD-6 option. I think that it needs to be cleaned up and cleaned up quickly.

I also would like the EPA to seriously try to reduce the amount of truck loads it would take to remove this material. In the pamphlet, you do talk about possibly using railroad to remove this material.

The reason for the, hopefully reducing the truckloads is because, whether they go out and take a left or a right, they are all going through residential neighborhoods. And any reduction in this type of traffic, I think, is a safer way to do it, especially if you can use the railroad. So, I would hope that that can be used.

Thank you.

HEARING OFFICER CIANCIARULO: Thank you.

Others wishing to make a comment for the record? Sir?

MR. VIEIRA: Rui Vieira from 11 Roberts Road.

Thank you for coming. I'm really surprised, you're the first one that I ever heard that a 20 year plan is less expensive than a five year plan. This must be an EPA financial -- I don't understand that at all.

But, the primary issue that I have is, I'm new to this. But, I've learned that you have not done a survey of how many people use this water. And that was one of the issues that you mentioned to be critical. I would think that that would be an essential, because those people could be contaminated right now every time they take a sip.

So, it just really seems to me that, in essence, SD-4, I believe, you call it, 20 years, I'll be an old man, probably broke from putting kids through college. And who is going to monitor this for 20 years. How will I know this information.

Are you going to publish for 75 years, or have the report sent to the library, will we have more hearings about the report. This is just, quite frankly, very disappointing. You can do better. We are paying for this.

MR. PALERMO: John Palermo, Billerica.

We have an artesian well.

Would you take into consideration that the EPA could run a test on that well?

HEARING OFFICER CIANCIARULO: Could you state your address, sir, for -- your address?

MR. PALERMO: Number 3 Ashdale Road, North Billerica.

HEARING OFFICER CIANCIARULO: Okay. We'll talk to you afterwards about that.

MR. PALERMO: Thank you.

HEARING OFFICER CIANCIARULO: Thank you.

MS. GURNEY: Hi. My name is Jackie Gurney. And I was on the original Superfund committee. And I'm standing here tonight, 20 years later. And I'm a little shocked that you're talking about another 20 years to finish this Superfund site.

HEARING OFFICER CIANCIARULO: That's your comment here?

MS. GURNEY: I mean, the subject of hazardous waste from Iron Horse Park, the asbestos, and you know it was one of those dumps that used to be here. I'm surprised that this is going to drag on for another 20 years.

I think, we should go with the five years.

HEARING OFFICER CIANCIARULO: Others wishing to make a comment? The second time around?

Fair enough.

MR. JOHNSON: Missed the opportunity the first time.

Since the --

HEARING OFFICER CIANCIARULO: Could you give your name again, sir, name and address?

MR. JOHNSON: David Johnson, 113 Gray Street, Billerica.

Since the -- what do they call that -- average hydraulic conductivity of these wells is roughly 131 feet per day, because the soil make up, there needs to be extensive -- extended testing of these wells, to go beyond the time period specified. The simple reason is that they need to control off site migration should it be heading toward the -- there are two aquifers. One of them is the Shawsheen River Watershed, which is the one which most -- this particular wetlands is in. And then, there is the Concord River Watershed, which the westerly side of the site is in.

So, water flowing in either watershed affects the water supplies. In fact, the Content Brook is considered a navigable waterway of the United States, for the simple reason that that water flows into the Shawsheen which flows into the Merrimack, which is used to water crops that are used in interstate commerce and those are -- the waters taken out in Haverhill, Mass. So, that essentially makes it, you can't put toothpaste in that water.

The -- it is necessary to make sure that these other sites are not contaminated. So, you need to continue the monitoring of the wells to make sure off site migration of pollutants doesn't occur.

Thank you.

MR. SAMPSON: Mark Sampson, 4 Carnel Drive.

I just wanted to follow up on a comment that Jackie had made a few minutes ago and ask the EPA to give us more clarification in regards to the dependency of OU-4 on OU-3.

Just to make sure I have the history correct, OU-3 was started in terms of testing, to figure out what to do, in 1993. It took 11 years and that is in 2004, for the EPA to finally decide on a plan to implement.

Since 2004, only one of the seven actions has been even put under way. We haven't even completed one of those seven.

So if I'm reading this correctly, I understand that there is a dependency for OU-3 to be much further along in order to even start OU-4. So this five-year plan, even if we are successful in getting EPA to change to SD-6 as the proposed plan, doesn't start -- the clock doesn't even start ticking until OU-3 is much further along.

I'd like to understand from the EPA, in a formal response, when OU-3 will be done, so that we can then gauge how much longer after that it will take us to get OU-4 completed.

Thank you.

HEARING OFFICER CIANCIARULO: Thank you.

Others wishing to make a comment before I close the hearing?

MS. DUROCHER: Hi. My name is Rachel Durocher and I live at 137 Pollard.

I am not sure that I'm the last commenter or someone else is coming up. But, just to put things in perspective, I just thought it would be fair to mention that, I was born in the '80s. And I just purchased a house and wasn't told that it was within this contamination or near it. And my property runs to the Concord River and I live at the intersection of Pollard and High Street.

And I just would like to leave you with that kind of thought of -- in terms of making some decisions so that it's not another 20 years before someone is coming up here to make a comment.

HEARING OFFICER CIANCIARULO: I don't see any other hands of people wishing to make a comment.

So, I'm going to go ahead and officially close the hearing.

The comments you made this evening, as well as comments we receive in writing will be responded to in what we call a responsiveness summary that will accompany our -- what's called a record of decision, our decision on the cleanup plan.

I have extended the comment period tonight to January 3rd. I understand, we have a request for additional extensions that have been placed on the record here tonight.

I can't grant a further extension here tonight, but, I will -- we will bring that back to our superiors and take that under consideration.

So, with that, I'm going to officially close the hearing. And we will stay behind to informally answer questions one on one if you have any.

I appreciate your attendance, appreciate your input. Thank you.

(Whereupon, at 8:29 p.m., the hearing was concluded.)

CERTIFICATE OF REPORTER AND TRANSCRIBER

This is to certify that the attached proceedings in the Matter of:

RE: PROPOSED CLEAN-UP PLAN FOR OPERABLE UNIT 4 AT THE IRON HORSE PARK SUPERFUND SITE

Place: Billerica, Massachusetts

Date: November 9, 2010

were held as herein appears, and that this is the true, accurate and complete transcript prepared from the notes and/or recordings taken of the above entitled proceeding.

Maryann Rossi　　　　11/09/10

Reporter　　　　Date

Maryann Rossi　　　　12/14/10

Transcriber

Date

Appendix F

Groundwater Use and Value Determination

GROUNDWATER USE AND VALUE DETERMINATION
Iron Horse Park
June, 1998

Pursuant to the Memorandum of Agreement between the EPA and the DEP concerning Ground Water Use and Value Determinations, and consistent with the Environmental Protection Agency's (EPA) 1996 Final Ground Water Use and Value Determination Guidance, the Department has developed a "Use and Value Determination" of the groundwater impacted by the Third Operable Unit of the Iron Horse Park Superfund Site (the "Site"). The purpose of the Use and Value Determination is to identify whether the aquifer related to the Site is of "High, Medium," or "Low" use and value. In the development of its Determination, the Department has applied the criteria for groundwater classification as promulgated in the Massachusetts Contingency Plan (MCP). The classification contained in the MCP considers criteria similar to those recommended in the Use and Value Guidance. The Department's recommendation for this Site includes both medium and low use and value depending on the location. This recommendation is explained in more detail below.

The Iron Horse Park Site occupies approximately 553 acres of land in Billerica, Massachusetts. Operable Units consist of: 1) OU #1 - B&M Lagoons, 2) OU #2 - Shaffer Landfill, and 3) OU #3 - nine source areas including a) B & M Railroad Landfill, b) RSI Landfill, c) B&M Locomotive Shop Disposal Areas, d) Old B&M Oil/Sludge Recycling Area, e) Contaminated Soils Area, f) Asbestos Landfill, g) Asbestos Lagoons, h) PCB Contamination, and i) Site-Wide Surface Water & Sediment Contamination. Contamination includes soils containing arsenic, lead, chromium, manganese, PCBs, and PAHs, and groundwater containing arsenic, barium, manganese, pesticides, PAHs, PCBs, and volatile organics. For the purposes of this Determination, the groundwater under evaluation is defined as that underlying the Site and the surrounding area extending in a two mile radius from the central portion of the Site (see attached 4 - mile radius map).

A portion of the aquifer underlying the Site is classified as a medium yield aquifer by the United States Geological Survey (USGS). Due to the presence of a rail yard on a portion of the aquifer, DEP, in accordance with the MCP, reclassified most of this aquifer as a non-potential drinking water source. However, the portion without the railyard remains a potential drinking water source, and therefore is of medium use and value.

To the northeast, within the surrounding area, are three public wells in the Tewksbury water system. A portion of the Interim Wellhead Protection Area (IWPA) for these wells also lies within this area. Although these wells are inactive, they are still considered a public drinking water supply. In order to meet drinking water standards (see GW-1 classification below) the contamination must meet GW-1 standards before entering the IWPA. The groundwater in this area is of medium use and value.

To the west of the Site, within the surrounding area is an approved Zone 2 for Chelmsford. To the southwest is the surface water supply from the Concord River for Billerica. Within one mile to the southwest also in Billerica, is a non-community water supply on the Concord River. None of these sources are likely to be affected by contamination from the Site. The sources are separated from the Site by a groundwater and surface water divide, and the general groundwater flow at the Site appears to be away from these sources.

Groundwater under certain areas of the Site and within the surrounding area aquifer is classified as GW-1, GW-2, and GW-3. For the purposes of the risk assessment for the Third Operable Unit groundwater, the Department defines groundwater classifications as follows:

GW-1 The groundwater is located within a current drinking water source or within a potential drinking water source.

Groundwater that is categorized as GW-1 solely due to its location within an Interim Wellhead Protection Area need not be categorized as GW-1 if it is demonstrated that there is no hydrogeologic connection between the groundwater and the public water supply well on the basis of the following:
a). the groundwater is hydrogeologically downgradient of the public water supply well based on regional groundwater flow and gradient, and beyond the stagnation point. The determination of such a stagnation point shall be based on site-specific parameters and the highest daily approved pumping rate for the public water supply well; or
b). the disposal site is cross-gradient (perpendicular) to regional groundwater flow direction and at sufficient distance from the public water supply well so that it is outside of the zone of contribution for the public water supply well. The determination of such a zone of contribution shall be based on site-specific parameters and the highest daily approved pumping rate for the public water supply well; or
c). a hydrogeologic barrier exists between the groundwater at the disposal site and the public water supply well.

GW-2 This designation addresses areas where there is a potential for migration of vapors from groundwater to occupied structures. The classification applies to locations where groundwater has an average annual depth of 15 feet or less and where there is an occupied building or structure within a 30 foot surface radius of that groundwater.

GW-3 This designation considers the impacts and risks associated with the discharge of groundwater to surface water and therefore applies to all groundwater.

Considering these classifications, the groundwater risk evaluation for the Third Operable Unit of the Iron Horse Park Site (and any Operable Unit that may follow) should include, but is not limited to, the following:

Human Health:

a) vapor seepage into buildings,
b) use as a public water supply,
c) use of the water in industrial processes,
d) excavation into groundwater (i.e., worker exposure),
e) discharge into surface water (and the consequential effects of the discharge--i.e., wading scenarios, recreation, fishing).

Ecological:

a) effects on the biota that make up the benthic community,
b) effects on the biota that feed on or in the benthic community, and on up the food chain, as determined by the substance's persistence and ability to bioaccumulate.

In light of the use and value factors and similar criteria established in the MCP that were examined in this determination, the Department recommends both a low and medium use and value for the Site groundwater.

TABLE 1a
IRON HORSE PARK OU#3 SITE GROUNDWATER USE AND VALUE DETERMINATION
May, 1998

USE AND VALUE FACTORS	RATING	IRON HORSE PARK OU #3: (3-O240-03) SITE-SPECIFIC DETERMINATION
1. Quantity	medium/low	-One Section of Medium Yield, most areas are Low Yield. -On-Site contaminants threaten Medium Yield Aquifer.
2. Quality	medium	- Site groundwater contaminants include volatile organics (primarily 1,2 dichloroethane and trichloroethene); pesticides (heptachlor epoxide); metals (arsenic, manganese, and beryllium); PCBs; and PAHs.
3. Current Public Water Supply Systems	medium	-A portion of a Wellhead Protection Area (IWPA) for Tewksbury falls within the northeast corner of the Study Area. A portion of the IWPA for Billerica lies within the southwest corner of the Study Area. - It is not a Sole Source Aquifer.
4. Current Private Drinking Water Supply Wells	low	-No known private drinking water supplies in the Study Area. - Private wells were shut down previously due to concern of potential migration of contaminants from other OU.
5. Likelihood and Identification of Future Drinking Water Use	medium/low	-Most of the Study Area groundwater is designated by the State as a Non-Potential Drinking Water Source Area. However, a portion of the Site aquifer is classified as a Potential Drinking Water Source -Site is zoned for industrial use, residential properties surround most of the Site -Not designated by the Town as an area for future drinking. -No current Activity and Use Limitations on the Study Area properties (it is expected that there will be groundwater use restrictions for the second OU).
6. Other Current or Reasonable Expected Ground Water Use(s) in Review Area	low	- On-site businesses use public water. Not expected to use site water for non-potable uses.
7, Ecological Value	high/medium	-Groundwater discharge to Middlesex Canal, Content Brook, Richardson Pond, and various wetlands on-site and in the Study Area. - Ecological risk identified for OU through RI Risk Assessment. - Endangered species habitat exists on-site.
8. Public Opinion	high/medium	-Public comment occurs during the promulgation of MCP regulations, and under CERCLA will occur during the Record of Decision process. -Public concerned that contamination could threaten current or future water supplies within the Study Area.

TABLE 1b
IRON HORSE PARK OU#3 SITE GROUNDWATER USE AND VALUE DETERMINATION
May, 1998

USE AND VALUE FACTORS	RATING	IRON HORSE PARK OU #3: (3-O240-03) SITE-SPECIFIC DETERMINATION
1. Quantity	medium/low	-One Section of Medium Yield, most areas are Low Yield. -On-Site contaminants threaten Medium Yield Aquifer.
2. Quality	medium	- Site groundwater contaminants include volatile organics (primarily 1,2 dichloroethane and trichloroethene); pesticides (heptachlor epoxide); metals (arsenic, manganese, and beryllium); PCBs; and PAHs.
3. Current Public Water Supply Systems	low	-A portion of a Wellhead Protection Area (IWPA) for Tewksbury falls within the northeast corner of the Study Area. A portion of the IWPA for Billerica lies within the southwest corner of the Study Area. - It is not a Sole Source Aquifer. However, it is unlikely that contamination from the Site is affecting these areas.
4. Current Private Drinking Water Supply Wells	low	-No known private drinking water supplies in the Study Area. - Private wells were shut down previously due to concern of potential migration of contaminants from other OU.
5. Likelihood and Identification of Future Drinking Water Use	low	-Most of the Study Area groundwater is designated by the State as a Non-Potential Drinking Water Source Area. -Site is zoned for industrial use, residential properties surround most of the Site -Not designated by the Town as an area for future drinking. -No current Activity and Use Limitations on the Study Area properties (it is expected that there will be groundwater use restrictions for the second OU).
6. Other Current or Reasonable Expected Ground Water Use(s) in Review Area	low	- On-site businesses use public water. Not expected to use site water for non-potable uses.
7, Ecological Value	high/medium	-Groundwater discharge to Middlesex Canal, Content Brook, Richardson Pond, and various wetlands on-site and in the Study Area. - Ecological risk identified for OU through RI Risk Assessment. - Endangered species habitat identified on-site.
8. Public Opinion	medium	-Public comment occurs during the promulgation of MCP regulations, and under CERCLA will occur during the Record of Decision process. -Public concerned that contamination could threaten current or future water supplies within the Study Area.

Appendix G

References

REFERENCES

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Appendix H

Administrative Record Index

Iron Horse Park
NPL Site Administrative Record File
Record of Decision (ROD)

Operable Unit 04 – Groundwater/Sediment

Index

ROD Dated: July 25, 2011
Released: August 2011

Prepared by
EPA New England
Office of Site Remediation & Restoration

Introduction to the Collection

This is the administrative record for the Iron Horse Park Superfund Site, North Billerica, Massachusetts, Operable Unit 04 – Groundwater/Sediment, Record of Decision (ROD), released August 2011. The file contains site-specific documents and a list of guidance documents used by EPA staff in selecting a response action at the site.

This record should replace the Record of Decision (ROD) Proposed Plan, released October, 2010. This record includes, by reference, the administrative record for the Iron Horse Park OU 01 Record of Decision (ROD), issued September 15, 1988, the Iron Horse Park OU 02 Record of Decision (ROD), issued July 27, 1991, the Iron Horse Park OU 02 Explanation of Significant Differences (ESD), issued September 8, 2000, the Iron Horse Park OU 03 Record of Decision (ROD), issued September 30, 2004, and the Iron Horse Park OU 03 Explanation of Significant Differences (ESD), issued July 19, 2009.

The administrative record file is available for review at:

EPA New England Office of
Site Remediation & Restoration
5 Post Office Sq., Suite 100 (OSRR 02-3)
Boston, MA 02109-3912
(by appointment)
617-918-1440 (phone)
617-918-0440 (fax)
www.epa.gov/region01/superfund/resource/records.htm

Billerica Public Library
15 Concord Road
Billerica, MA 01821
978-671-0984 (phone)
www.billericalibrary.org

An administrative record file is required by the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), as amended by the Superfund Amendments and Reauthorization Act (SARA).

Please note that the compact disc(s) (CD) containing this Administrative Record may include index data and other metadata (hereinafter collectively referred to as metadata) to allow the user to conduct index searches and key word searches across all the files contained on the CD. All the information that appears in the metadata, including any dates associated with creation of the indexing data, is not part of the Administrative Record for the Site under CERCLA and shall not be construed as relevant to the documents that comprise the Administrative Record. This metadata is provided as a convenience for the user and is not part of the Administrative Record.

Questions about this administrative record file should be directed to the EPA New England site manager.

03: REMEDIAL INVESTIGATION (RI)

File Break: 03.02

472618 DATA EVALUATION REPORT

Author: METCALF & EDDY
Addressee: US EPA REGION 1
Doc Type: SAMPLING DATA REPORT
Doc Date: 03/01/2005 **# of Pages:** 469
Weston Number:

472620 GROUNDWATER DATA EVALUATION REPORT

Author: METCALF & EDDY/AECOM
Addressee: US EPA REGION 1
Doc Type: SAMPLING DATA REPORT
Doc Date: 09/01/2006 **# of Pages:** 586
Weston Number:

472621 SUPPLEMENTAL GROUNDWATER DATA EVALUATION REPORT

Author: METCALF & EDDY/AECOM
Addressee: US EPA REGION 1
Doc Type: REPORT SAMPLING DATA
Doc Date: 11/01/2008 **# of Pages:** 33
Weston Number:

03: REMEDIAL INVESTIGATION (RI)

File Break: **03.10**

460274 SUPPLEMENTAL HUMAN HEALTH RISK ASSESSMENT (HHRA)

Author: METCALF & EDDY/AECOM
Addressee: US EPA REGION 1
Doc Type: REPORT
RISK/HEALTH ASSESSMENT
Doc Date: 02/01/2008 **# of Pages:** 260
Weston Number:

472619 ECOLOGICAL RISK ASSESSMENT / WETLANDS REMEDIAL INVESTIGATION ADDENDUM (ERA/WRIA)

Author: METCALF & EDDY/AECOM
Addressee: US EPA REGION 1
Doc Type: RISK/HEALTH ASSESSMENT
REPORT
Doc Date: 09/01/2006 **# of Pages:** 632
Weston Number:

04: FEASIBILITY STUDY (FS)

File Break: **04.01**

490413 ECOLOGICAL PRELIMINARY REMEDIATION GOAL (PRG) DEVELOPMENT FOR SEDIMENT AT OU4

Author: DON MCELROY US EPA REGION 1
Addressee:
Doc Date: 07/21/2011 **# of Pages:** 1
Weston Number:

04: FEASIBILITY STUDY (FS)

File Break: 04.06

472622 DRAFT FINAL FEASIBILITY STUDY (FS)

Author: METCALF & EDDY/AECOM
Addressee: US EPA REGION 1
Doc Type: FEASIBILITY STUDY (FS)
REPORT

Doc Date: 10/01/2010 **# of Pages:** 271
Weston Number:

File Break: 04.09

469099 PROPOSED PLAN

Author: US EPA REGION 1
Addressee:
Doc Type: PROPOSED PLAN
REPORT
PUBLIC (AND OTHER) COMMENTS

Doc Date: 10/01/2010 **# of Pages:** 11
Weston Number:

482411 LETTER COMMENTING ON THE PROPOSED PLAN FOR OPERABLE UNIT 4 (OU 4) ON BEHALF OF PAN AM RAILWAYS

Author: GREGG A DEMERS ENVIRONMENTAL RESOURCES MANAG
Addressee: MAELLE DUQUOC ENVIRONMENTAL RESOURCES MANAGI
DON MCELROY US EPA REGION 1
Doc Type: PUBLIC (AND OTHER) COMMENTS
LETTER
CORRESPONDENCE

Doc Date: 11/23/2010 **# of Pages:** 3
Weston Number:

04: FEASIBILITY STUDY (FS)

File Break: **04.09**

482412 **MEMO COMMENTING ON THE PROPOSED PLAN FOR OPERABLE UNIT 4 (OU 4)**

Author: MALCOLM PIRNIE INC
Addressee: MASSACHUSETTS BAY TRANSPORTATION AUTHORITY
Doc Type: CORRESPONDENCE
MEMO
PUBLIC (AND OTHER) COMMENTS

Doc Date: 11/24/2010 **# of Pages:** 27
Weston Number:

482413 **MEMO WITH COMMENTS ON THE PROPOSED PLAN FOR OPERABLE UNIT 4 (OU 4) FROM THE MASSACHUSETTS BAY TRANSPORTATION AUTHORITY (MBTA)**

Author: JULIE TAYLOR NOBLE AND WICKERSHAM LLP
Addressee: DON MCELROY US EPA REGION 1
Doc Type: MEMO
PUBLIC (AND OTHER) COMMENTS
CORRESPONDENCE

Doc Date: 11/24/2010 **# of Pages:** 1
Weston Number:

482414 **LETTER COMMENTING ON THE PROPOSED PLAN FOR OPERABLE UNIT 4 (OU 4)**

Author: PHILIP J NEWFELL BILLERICA (MA) RESIDENT
Addressee: DON MCELROY US EPA REGION 1
Doc Type: PUBLIC (AND OTHER) COMMENTS
LETTER
CORRESPONDENCE

Doc Date: 11/16/2010 **# of Pages:** 2
Weston Number:

04: FEASIBILITY STUDY (FS)

File Break: **04.09**

70000525 EMAIL COMMENTING ON THE OPERABLE UNIT 4 (OU 4) PROPOSED PLAN

Author: LINDSAY JENKINS BILLERICA (MA) RESIDENT
Addressee: DON MCELROY US EPA REGION 1
Doc Date: 01/14/2011 **# of Pages:** 1
Weston Number:
Doc Type: CORRESPONDENCE
PUBLIC (AND OTHER) COMMENTS
EMAIL

70000526 EMAIL COMMENTING ON THE OPERABLE UNIT 4 (OU 4) PROPOSED PLAN

Author: MARY STAVRO BILLERICA (MA) RESIDENT
Addressee: DON MCELROY US EPA REGION 1
Doc Date: 01/13/2011 **# of Pages:** 1
Weston Number:
Doc Type: CORRESPONDENCE
PUBLIC (AND OTHER) COMMENTS
EMAIL

70000527 EMAIL COMMENTING ON THE OPERABLE UNIT 4 (OU 4) PROPOSED PLAN

Author: SUSAN HANLON BILLERICA (MA) RESIDENT
Addressee: DON MCELROY US EPA REGION 1
Doc Date: 01/13/2011 **# of Pages:** 1
Weston Number:
Doc Type: CORRESPONDENCE
PUBLIC (AND OTHER) COMMENTS
EMAIL

04: FEASIBILITY STUDY (FS)

File Break: **04.09**

70000528 EMAIL COMMENTING ON THE OPERABLE UNIT 4 (OU 4) PROPOSED PLAN

Author: LINDA MURRAY BILLERICA (MA) RESIDENT
Addressee: DON MCELROY US EPA REGION 1
Doc Type: CORRESPONDENCE
PUBLIC (AND OTHER) COMMENTS
EMAIL
Doc Date: 01/13/2011 **# of Pages:** 1
Weston Number:

70000529 EMAIL COMMENTING ON THE OPERABLE UNIT 4 (OU 4) PROPOSED PLAN

Author: KIM SCOTT LOWELL (MA) RESIDENT
Addressee: DON MCELROY US EPA REGION 1
Doc Type: CORRESPONDENCE
EMAIL
PUBLIC (AND OTHER) COMMENTS
Doc Date: 01/13/2011 **# of Pages:** 1
Weston Number:

70000530 EMAIL COMMENTING ON THE OPERABLE UNIT 4 (OU 40 PROPOSED PLAN

Author: STEPHANIE RICHARDSON METHUEN (MA) RESIDENT
Addressee: DON MCELROY US EPA REGION 1
Doc Type: CORRESPONDENCE
EMAIL
PUBLIC (AND OTHER) COMMENTS
Doc Date: 01/13/2011 **# of Pages:** 1
Weston Number:

04: FEASIBILITY STUDY (FS)

File Break: **04.09**

70000531 EMAIL COMMENTING ON THE OPERABLE UNIT 4 (OU 4) PROPOSED PLAN

Author: SEAN HEASLEY BILLERICA (MA) RESIDENT
Addressee: DON MCELROY US EPA REGION 1
Doc Date: 01/13/2011 **# of Pages:** 1
Weston Number:
Doc Type: CORRESPONDENCE
EMAIL
PUBLIC (AND OTHER) COMMENTS

70000532 EMAIL COMMENTING ON THE OPERABLE UNIT 4 (OU 4) PROPOSED PLAN

Author: ROBERT CASEY BILLERICA (MA) RESIDENT
Addressee: DON MCELROY US EPA REGION 1
Doc Date: 01/13/2011 **# of Pages:** 1
Weston Number:
Doc Type: CORRESPONDENCE
PUBLIC (AND OTHER) COMMENTS
EMAIL

70000533 EMAIL COMMENTING ON THE OPERABLE UNIT 4 (OU 4) PROPOSED PLAN

Author: MARY HEASLEY BILLERICA (MA) RESIDENT
Addressee: DON MCELROY US EPA REGION 1
Doc Date: 01/13/2011 **# of Pages:** 1
Weston Number:
Doc Type: CORRESPONDENCE
EMAIL
PUBLIC (AND OTHER) COMMENTS

04: FEASIBILITY STUDY (FS)

File Break: 04.09

70000534 EMAIL COMMENTING ON THE OPERABLE UNIT 4 (OU 4) PROPOSED PLAN

Author: JESSE STRACHMAN BILLERICA (MA) RESIDENT
Addressee: DON MCELROY US EPA REGION 1
Doc Date: 01/13/2011 **# of Pages:** 1
Weston Number:
Doc Type: CORRESPONDENCE
PUBLIC (AND OTHER) COMMENTS
EMAIL

70000535 EMAIL COMMENTING ON THE OPERABLE UNIT 4 (OU 4) PROPOSED PLAN

Author: KATHLEEN CALLAN TEWKSBURY (MA) RESIDENT
Addressee: DON MCELROY US EPA REGION 1
Doc Date: 01/13/2011 **# of Pages:** 1
Weston Number:
Doc Type: CORRESPONDENCE
EMAIL
PUBLIC (AND OTHER) COMMENTS

70000536 EMAIL WITH ATTACHED COMMENTS ON THE OPERABLE UNIT 4 (OU 4) PROPOSED PLAN AND COPIES OF PETITION

Author: MARK A SAMPSON BILLERICA (MA) RESIDENT
Addressee: DON MCELROY US EPA REGION 1
Doc Date: 01/13/2011 **# of Pages:** 1
Weston Number:
Doc Type: CORRESPONDENCE
EMAIL
PUBLIC (AND OTHER) COMMENTS

04: FEASIBILITY STUDY (FS)

File Break: 04.09

70000537 EMAIL COMMENTING ON THE OPERABLE UNIT 4 (OU 4) PROPOSED PLAN

Author: SHAWN MCNEILL BILLERICA (MA) RESIDENT
Addressee: DON MCELROY US EPA
Doc Date: 01/13/2011
# of Pages: 1
Weston Number:
Doc Type: CORRESPONDENCE
PUBLIC (AND OTHER) COMMENTS
EMAIL

70000538 EMAIL COMMENTING ON THE OPERABLE UNIT 4 (OU 4) PROPOSED PLAN

Author: PATRICIA FERRERA BILLERICA (MA) RESIDENT
Addressee: DON MCELROY US EPA REGION 1
Doc Date: 01/13/2011
# of Pages: 1
Weston Number:
Doc Type: CORRESPONDENCE
PUBLIC (AND OTHER) COMMENTS
EMAIL

70000539 EMAIL COMMENTING ON THE OPERABLE UNIT 4 (OU 4) PROPOSED PLAN

Author: KRISTINE MCNEILL BILLERICA (MA) RESIDENT
Addressee: DON MCELROY US EPA REGION 1
Doc Date: 01/13/2011
# of Pages: 1
Weston Number:
Doc Type: CORRESPONDENCE
EMAIL
PUBLIC (AND OTHER) COMMENTS

04: FEASIBILITY STUDY (FS)

File Break: 04.09

70000540 EMAIL COMMENTING ON THE OPERABLE UNIT 4 (OU 4) PROPOSED PLAN

Author: CHARLES FERRERA BILLERICA (MA) RESIDENT
Addressee: DON MCELROY US EPA REGION 1
Doc Date: 01/13/2011 **# of Pages:** 1
Weston Number:
Doc Type: CORRESPONDENCE
PUBLIC (AND OTHER) COMMENTS
EMAIL

70000541 EMAIL COMMENTING ON THE OPERABLE UNIT 4 (OU 4) PROPOSED PLAN

Author: BOB MCNEILL BILLERICA (MA) RESIDENT
Addressee: DON MCELROY US EPA REGION 1
Doc Date: 01/13/2011 **# of Pages:** 1
Weston Number:
Doc Type: CORRESPONDENCE
EMAIL
PUBLIC (AND OTHER) COMMENTS

70000542 EMAIL ATTACHMENT- COPIES OF PETITION PAGES

Author:
Addressee:
Doc Date: 01/13/2011 **# of Pages:** 9
Weston Number:
Doc Type: PUBLIC (AND OTHER) COMMENTS
LIST

04: FEASIBILITY STUDY (FS)

File Break: **04.09**

70000543 EMAIL ATTACHMENT - LETTER COMMENTING ON THE OPERABLE UNIT 4 (OU 4) PROPOSED PLAN

Author: MARK A SAMPSON BILLERICA (MA) RESIDENT
Addressee: DON MCELROY US EPA REGION 1
Doc Date: 01/13/2011 **# of Pages:** 3
Weston Number:
Doc Type: CORRESPONDENCE
LETTER
PUBLIC (AND OTHER) COMMENTS

70000545 EMAIL COMMENTING ON THE OPERABLE UNIT 4 (OU 4) PROPOSED PLAN

Author: ALLISON RUGG BILLERICA (MA) RESIDENT
Addressee: DON MCELROY US EPA REGION 1
Doc Date: 01/14/2011 **# of Pages:** 1
Weston Number:
Doc Type: CORRESPONDENCE
EMAIL
PUBLIC (AND OTHER) COMMENTS

70000546 EMAIL COMMENTING ON THE OPERABLE UNIT 4 (OU 4) PROPOSED PLAN

Author: KENNETH RUGG BILLERICA (MA) RESIDENT
Addressee: DON MCELROY US EPA REGION 1
Doc Date: 01/14/2011 **# of Pages:** 1
Weston Number:
Doc Type: CORRESPONDENCE
EMAIL
PUBLIC (AND OTHER) COMMENTS

04: FEASIBILITY STUDY (FS)

File Break: **04.09**

70000547 EMAIL COMMENTING ON THE OPERABLE UNIT 4 (OU 4) PROPOSED PLAN

Author: AMBER OOSTDYK BILLERICA (MA) RESIDENT
Addressee: DON MCELROY US EPA REGION 1
Doc Type: CORRESPONDENCE
EMAIL
PUBLIC (AND OTHER) COMMENTS

Doc Date: 01/14/2011 **# of Pages:** 1
Weston Number:

70000548 EMAIL COMMENTING ON THE OPERABLE UNIT 4 (OU 4) PROPOSED PLAN

Author: ANDREA DUTILE BILLERICA (MA) RESIDENT
Addressee: DON MCELROY US EPA REGION 1
Doc Type: CORRESPONDENCE
EMAIL
PUBLIC (AND OTHER) COMMENTS

Doc Date: 01/14/2011 **# of Pages:** 1
Weston Number:

70000549 EMAIL COMMENTING ON THE OPERABLE UNIT 4 (OU 4) PROPOSED PLAN

Author: MARIBEL EINARSON BILLERICA (MA) RESIDENT
Addressee: DON MCELROY US EPA REGION 1
Doc Type: CORRESPONDENCE
PUBLIC (AND OTHER) COMMENTS
EMAIL

Doc Date: 01/14/2011 **# of Pages:** 1
Weston Number:

04: FEASIBILITY STUDY (FS)

File Break: **04.09**

70000550 EMAIL COMMENTING ON THE OPERABLE UNIT 4 (OU 4) PROPOSED PLAN

Author: DAVID OOSTDYK BILLERICA (MA) RESIDENT
Addressee: DON MCELROY US EPA REGION 1
Doc Date: 01/14/2011 **# of Pages:** 1
Weston Number:
Doc Type: CORRESPONDENCE
EMAIL
PUBLIC (AND OTHER) COMMENTS

70000551 EMAIL COMMENTING ON THE OPERABLE UNIT 4 (OU 4) PROPOSED PLAN

Author: PATRICIA MONAHAN BILLERICA (MA) RESIDENT
Addressee: DON MCELROY US EPA REGION 1
Doc Date: 01/14/2011 **# of Pages:** 1
Weston Number:
Doc Type: CORRESPONDENCE
PUBLIC (AND OTHER) COMMENTS
EMAIL

70000552 EMAIL COMMENTING ON THE OPERABLE UNIT 4 (OU 4) PROPOSED PLAN

Author: RICHARD PERCUOCO BILLERICA (MA) RESIDENT
Addressee: DON MCELROY US EPA REGION 1
Doc Date: 01/14/2011 **# of Pages:** 1
Weston Number:
Doc Type: CORRESPONDENCE
PUBLIC (AND OTHER) COMMENTS
EMAIL

04: FEASIBILITY STUDY (FS)

File Break: **04.09**

70000553 **EMAIL COMMENTING ON THE OPERABLE UNIT 4 (OU 4) PROPOSED PLAN**

Author: JOSEPH DONOGHUE BILLERICA (MA) RESIDENT
Addressee: DON MCELROY US EPA REGION 1
Doc Date: 01/14/2011 **# of Pages:** 1
Weston Number:
Doc Type: CORRESPONDENCE
PUBLIC (AND OTHER) COMMENTS
EMAIL

70000554 **EMAIL COMMENTING ON THE OPERABLE UNIT 4 (OU 4) PROPOSED PLAN**

Author: EDWARD RADZVIN BILLERICA (MA) RESIDENT
Addressee: DON MCELROY US EPA REGION 1
Doc Date: 01/14/2011 **# of Pages:** 1
Weston Number:
Doc Type: CORRESPONDENCE
PUBLIC (AND OTHER) COMMENTS
EMAIL

70000555 **EMAIL COMMENTING ON THE OPERABLE UNIT 4 (OU 4) PROPOSED PLAN**

Author: RICHARD KARAMANIAN BILLERICA (MA) RESIDENT
Addressee: DON MCELROY US EPA REGION 1
Doc Date: 01/14/2011 **# of Pages:** 1
Weston Number:
Doc Type: CORRESPONDENCE
PUBLIC (AND OTHER) COMMENTS
EMAIL

04: FEASIBILITY STUDY (FS)

File Break: **04.09**

70000556 EMAIL COMMENTING ON THE OPERABLE UNIT 4 (OU 4) PROPOSED PLAN

Author: MARIE OROURKE BILLERICA (MA) RESIDENT
Addressee: DON MCELROY US EPA REGION 1
Doc Date: 01/14/2011 **# of Pages:** 1
Weston Number:
Doc Type: CORRESPONDENCE
PUBLIC (AND OTHER) COMMENTS
EMAIL

70000557 EMAIL COMMENTING ON THE OPERABLE UNIT 4 (OU 4) PROPOSED PLAN

Author: DEREK KARAMANIAN BILLERICA (MA) RESIDENT
Addressee: DON MCELROY US EPA REGION 1
Doc Date: 01/14/2011 **# of Pages:** 1
Weston Number:
Doc Type: CORRESPONDENCE
EMAIL
PUBLIC (AND OTHER) COMMENTS

70000558 EMAIL COMMENTING ON THE OPERABLE UNIT 4 (OU 4) PROPOSED PLAN

Author: DONNA KELLY BILLERICA (MA) RESIDENT
Addressee: DON MCELROY US EPA REGION 1
Doc Date: 01/14/2011 **# of Pages:** 1
Weston Number:
Doc Type: CORRESPONDENCE
EMAIL
PUBLIC (AND OTHER) COMMENTS

04: FEASIBILITY STUDY (FS)

File Break: **04.09**

70000559 EMAIL COMMENTING ON THE OPERABLE UNIT 4 (OU 4) PROPOSED PLAN

Author: KATHLEEN VOGAN BILLERICA (MA) RESIDENT
Addressee: DON MCELROY US EPA REGION 1
Doc Type: CORRESPONDENCE
EMAIL
PUBLIC (AND OTHER) COMMENTS
Doc Date: 01/14/2011 **# of Pages:** 1
Weston Number:

70000560 EMAIL COMMENTING ON THE OPERABLE UNIT 4 (OU 4) PROPOSED PLAN

Author: ROBERT STANTON BILLERICA (MA) RESIDENT
Addressee: DON MCELROY US EPA REGION 1
Doc Type: CORRESPONDENCE
EMAIL
PUBLIC (AND OTHER) COMMENTS
Doc Date: 01/14/2011 **# of Pages:** 1
Weston Number:

70000561 EMAIL COMMENTING ON THE OPERABLE UNIT 4 (OU 4) PROPOSED PLAN

Author: TARYN HALLWEAVER TOXICS ACTION CENTER
Addressee: DON MCELROY US EPA REGION 1
Doc Type: CORRESPONDENCE
EMAIL
PUBLIC (AND OTHER) COMMENTS
Doc Date: 01/14/2011 **# of Pages:** 2
Weston Number:

04: FEASIBILITY STUDY (FS)

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70000562 EMAIL TRANSMITTING ATTACHED COMMENTS ON THE OPERABLE UNIT 4 (OU 4) PROPOSED PLAN

Author: EDWARD CAMPLESE BILLERICA (MA) RESIDENT
Addressee: DON MCELROY US EPA REGION 1
Doc Type: CORRESPONDENCE
PUBLIC (AND OTHER) COMMENTS
EMAIL

Doc Date: 01/14/2011 **# of Pages:** 1
Weston Number:

70000563 EMAIL COMMENTING ON THE OPERABLE UNIT 4 (OU 4) PROPOSED PLAN

Author: JUDI LUCIANO NORTH ANDOVER (MA) RESIDENT
Addressee: DON MCELROY US EPA REGION 1
Doc Type: CORRESPONDENCE
PUBLIC (AND OTHER) COMMENTS
EMAIL

Doc Date: 01/14/2011 **# of Pages:** 1
Weston Number:

70000564 EMAIL COMMENTING ON THE OPERABLE UNIT 4 (OU 4) PROPOSED PLAN

Author: HOLLY PREES CHELMSFORD (MA) RESIDENT
Addressee: DON MCELROY US EPA REGION 1
Doc Type: CORRESPONDENCE
EMAIL
PUBLIC (AND OTHER) COMMENTS

Doc Date: 01/13/2011 **# of Pages:** 1
Weston Number:

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File Break: **04.09**

70000565 EMAIL COMMENTING ON THE OPERABLE UNIT 4 (OU 4) PROPOSED PLAN

Author: CHRISTINE DONOGHUE BILLERICA (MA) RESIDENT
Addressee: DON MCELROY US EPA REGION 1
Doc Type: CORRESPONDENCE
PUBLIC (AND OTHER) COMMENTS
EMAIL
Doc Date: 01/13/2011 **# of Pages:** 1
Weston Number:

70000566 EMAIL COMMENTING ON THE OPERABLE UNIT 4 (OU 4) PROPOSED PLAN

Author: JOSEPH DONOGHUE BILLERICA (MA) RESIDENT
Addressee: DON MCELROY US EPA REGION 1
Doc Type: CORRESPONDENCE
EMAIL
PUBLIC (AND OTHER) COMMENTS
Doc Date: 01/13/2011 **# of Pages:** 1
Weston Number:

70000567 EMAIL COMMENTING ON THE OPERABLE UNIT 4 (OU 4) PROPOSED PLAN

Author: JOHN OCONNELL BILLERICA (MA) RESIDENT
Addressee: DON MCELROY US EPA REGION 1
Doc Type: CORRESPONDENCE
PUBLIC (AND OTHER) COMMENTS
EMAIL
Doc Date: 01/13/2011 **# of Pages:** 1
Weston Number:

04: FEASIBILITY STUDY (FS)

File Break: **04.09**

70000568 EMAIL COMMENTING ON THE OPERABLE UNIT 4 (OU 4) PROPOSED PLAN

Author: KATHLEEN RUGG BILLERICA (MA) RESIDENT
Addressee: DON MCELROY US EPA REGION 1
Doc Date: 01/13/2011 **# of Pages:** 1
Weston Number:
Doc Type: CORRESPONDENCE
EMAIL
PUBLIC (AND OTHER) COMMENTS

70000569 EMAIL COMMENTING ON THE OPERABL E UNIT 4 (OU 4) PROPOSED PLAN

Author: CATHY KARAMANIAN BILLERICA (MA) RESIDENT
Addressee: DON MCELROY US EPA REGION 1
Doc Date: 01/14/2011 **# of Pages:** 1
Weston Number:
Doc Type: CORRESPONDENCE
EMAIL
PUBLIC (AND OTHER) COMMENTS

70000570 EMAIL COMMENTING ON THE OPERABLE UNIT 4 (OU 4) PROPOSED PLAN

Author: JOANN LAMAR BILLERICA (MA) RESIDENT
Addressee: DON MCELROY US EPA REGION 1
Doc Date: 01/14/2011 **# of Pages:** 1
Weston Number:
Doc Type: CORRESPONDENCE
EMAIL
PUBLIC (AND OTHER) COMMENTS

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File Break: 04.09

70000572 EMAIL COMMENTING ON THE OPERABLE UNIT 4 (OU 4) PROPOSED PLAN

Author: REBECCA STANTON BILLERICA (MA) RESIDENT
Addressee: DON MCELROY US EPA REGION 1
Doc Date: 01/12/2011 **# of Pages:** 1
Weston Number:
Doc Type: CORRESPONDENCE
EMAIL
PUBLIC (AND OTHER) COMMENTS

70000573 EMAIL COMMENTING ON THE OPERABLE UNIT 4 (OU 4) PROPOSED PLAN

Author: JULIE RHYND BILLERICA (MA) RESIDENT
Addressee: DON MCELROY US EPA REGION 1
Doc Date: 01/12/2011 **# of Pages:** 1
Weston Number:
Doc Type: CORRESPONDENCE
EMAIL
PUBLIC (AND OTHER) COMMENTS

70000574 EMAIL COMMENTING ON THE OPERABLE UNIT 4 (OU 4) PROPOSED PLAN

Author: TOBY MARSHALL BILLERICA (MA) RESIDENT
Addressee: DON MCELROY US EPA REGION 1
Doc Date: 01/12/2011 **# of Pages:** 1
Weston Number:
Doc Type: CORRESPONDENCE
EMAIL
PUBLIC (AND OTHER) COMMENTS

04: FEASIBILITY STUDY (FS)

File Break: **04.09**

70000575 EMAIL COMMENTING ON THE OPERABLE UNIT 4 (OU 4) PROPOSED PLAN

Author: ASHLEY PAVIA BILLERICA (MA) RESIDENT
Addressee: DON MCELROY US EPA REGION 1
Doc Type: CORRESPONDENCE
EMAIL
PUBLIC (AND OTHER) COMMENTS
Doc Date: 01/12/2011
# of Pages: 1
Weston Number:

70000576 EMAIL COMMENTING ON THE OPERABLE UNIT 4 (OU 4) PROPOSED PLAN

Author: JOYCE B EMERSON BILLERICA (MA) RESIDENT
Addressee: DON MCELROY US EPA REGION 1
Doc Type: CORRESPONDENCE
PUBLIC (AND OTHER) COMMENTS
EMAIL
Doc Date: 01/12/2011
# of Pages: 1
Weston Number:

70000577 EMAIL COMMENTING ON THE OPERABLE UNIT 4 (OU 4) PROPOSED PLAN

Author: MAUREEN LOONEY BILLERICA (MA) RESIDENT
Addressee: DON MCELROY US EPA REGION 1
Doc Type: CORRESPONDENCE
PUBLIC (AND OTHER) COMMENTS
EMAIL
Doc Date: 01/12/2011
# of Pages: 1
Weston Number:

04: FEASIBILITY STUDY (FS)

File Break: **04.09**

70000578 LETTER COMMENTING ON THE OPERABLE UNIT 4 (OU 4) PROPOSED PLAN

Author: EDWARD A CAMPLESE   BILLERICA WATCHERS GROUP
Addressee: DON MCELROY   US EPA REGION 1
Doc Date: 01/14/2011   **# of Pages:** 5
Weston Number:
Doc Type: CORRESPONDENCE
LETTER
PUBLIC (AND OTHER) COMMENTS

70000580 EMAIL COMMENTING ON THE OPERABLE UNIT 4 (OU 4) PROPOSED PLAN

Author: PAMELA HALL   BILLERICA (MA) RESIDENT
Addressee: DON MCELROY   US EPA REGION 1
Doc Date: 01/08/2011   **# of Pages:** 1
Weston Number:
Doc Type: CORRESPONDENCE
EMAIL
PUBLIC (AND OTHER) COMMENTS

70000581 EMAIL COMMENTING ON THE OPERABLE UNIT 4 (OU 4) PROPOSED PLAN

Author: BRADLEY S EMERSON   BILLERICA (MA) RESIDENT
Addressee: DON MCELROY   US EPA REGION 1
Doc Date: 01/08/2011   **# of Pages:** 1
Weston Number:
Doc Type: CORRESPONDENCE
EMAIL
PUBLIC (AND OTHER) COMMENTS

04: FEASIBILITY STUDY (FS)

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70000582 EMAIL COMMENTING ON THE OPERABLE UNIT 4 (OU 4) PROPOSED PLAN

Author: JENNIFER SLANEY BILLERICA (MA) RESIDENT
Addressee: DON MCELROY US EPA REGION 1
Doc Date: 01/08/2011 **# of Pages:** 1
Weston Number:
Doc Type: CORRESPONDENCE
EMAIL
PUBLIC (AND OTHER) COMMENTS

70000583 EMAIL COMMENTING ON THE OPERABLE UNIT 4 (OU 4) PROPOSED PLAN

Author: JANET PALERMO BILLERICA (MA) RESIDENT
Addressee: JOHN PALERMO BILLERICA (MA) RESIDENT
DON MCELROY US EPA REGION 1
Doc Date: 01/08/2011 **# of Pages:** 1
Weston Number:
Doc Type: CORRESPONDENCE
EMAIL
PUBLIC (AND OTHER) COMMENTS

70000584 EMAIL COMMENTING ON THE OPERABLE UNIT 4 (OU 4) PROPOSED PLAN

Author: ROBERT ANTONELLI BILLERICA (MA) RESIDENT
Addressee: DON MCELROY US EPA REGION 1
Doc Date: 01/08/2011 **# of Pages:** 1
Weston Number:
Doc Type: CORRESPONDENCE
PUBLIC (AND OTHER) COMMENTS
EMAIL

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File Break: 04.09

70000585 EMAIL COMMENTING ON THE OPERABLE UNIT 4 (OU 4) PROPOSED PLAN

Author: JANET MORRIS BILLERICA (MA) RESIDENT
Addressee: DON MCELROY US EPA REGION 1
Doc Type: CORRESPONDENCE
PUBLIC (AND OTHER) COMMENTS
EMAIL

Doc Date: 01/08/2011 **# of Pages:** 1
Weston Number:

70000586 EMAIL COMMENTING ON THE OPERABLE UNIT 4 (OU 4) PROPOSED PLAN

Author: JACQUELINE HODGKINS BILLERICA (MA) RESIDENT
Addressee: DON MCELROY US EPA REGION 1
Doc Type: CORRESPONDENCE
EMAIL
PUBLIC (AND OTHER) COMMENTS

Doc Date: 01/08/2011 **# of Pages:** 1
Weston Number:

70000587 EMAIL COMMENTING ON THE OPERABLE UNIT 4 (OU 4) PROPOSED PLAN

Author: WILLIAM D BARRY BILLERICA (MA) RESIDENT
Addressee: DON MCELROY US EPA REGION 1
Doc Type: CORRESPONDENCE
PUBLIC (AND OTHER) COMMENTS
EMAIL

Doc Date: 01/08/2011 **# of Pages:** 1
Weston Number:

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70000588 EMAIL COMMENTING ON THE OPERABLE UNIT 4 (OU 4) PROPOSED PLAN

Author: NANCY L BARRY BILLERICA (MA) RESIDENT
Addressee: DON MCELROY US EPA REGION 1
Doc Date: 01/08/2011 **# of Pages:** 1
Weston Number:
Doc Type: CORRESPONDENCE
EMAIL
PUBLIC (AND OTHER) COMMENTS

70000589 EMAIL COMMENTING ON THE OPERABLE UNIT 4 (OU 4) PROPOSED PLAN

Author: KERRI S GAGNON BILLERICA (MA) RESIDENT
Addressee: DON MCELROY US EPA REGION 1
Doc Date: 01/08/2011 **# of Pages:** 1
Weston Number:
Doc Type: CORRESPONDENCE
EMAIL
PUBLIC (AND OTHER) COMMENTS

70000590 EMAIL COMMENTING ON THE OPERABLE UNIT 4 (OU 4) PROPOSED PLAN

Author: KEVIN R BROOKS BILLERICA (MA) RESIDENT
Addressee: DON MCELROY US EPA REGION 1
Doc Date: 01/08/2011 **# of Pages:** 1
Weston Number:
Doc Type: CORRESPONDENCE
PUBLIC (AND OTHER) COMMENTS
EMAIL

04: FEASIBILITY STUDY (FS)

File Break: **04.09**

70000591 EMAIL COMMENTING ON THE OPERABLE UNIT 4 (OU 4) PROPOSED PLAN

Author: DEBRA JENKINS BILLERICA (MA) RESIDENT
Addressee: DON MCELROY US EPA REGION 1
Doc Date: 01/09/2011 **# of Pages:** 1
Weston Number:
Doc Type: CORRESPONDENCE
EMAIL
PUBLIC (AND OTHER) COMMENTS

70000592 EMAIL COMMENTING ON THE OPERABLE UNIT 4 (OU 4) PROPOSED PLAN

Author: WILLIAM H JR JENKINS BILLERICA (MA) RESIDENT
Addressee: DON MCELROY US EPA REGION 1
Doc Date: 01/09/2011 **# of Pages:** 1
Weston Number:
Doc Type: CORRESPONDENCE
PUBLIC (AND OTHER) COMMENTS
EMAIL

70000593 EMAIIL COMMENTING ON THE OPERABLE UNIT 4 (OU 4) PROPOSED PLAN

Author: WENDY MURRAY BILLERICA (MA) RESIDENT
Addressee: DON MCELROY US EPA REGION 1
Doc Date: 01/09/2011 **# of Pages:** 1
Weston Number:
Doc Type: CORRESPONDENCE
EMAIL
PUBLIC (AND OTHER) COMMENTS

04: FEASIBILITY STUDY (FS)

File Break: **04.09**

70000594 EMAIL COMMENTING ON THE OPERABLE UNIT 4 (OU 4) PROPOSED PLAN

Author: MELISSA SMITH BILLERICA (MA) RESIDENT
Addressee: DON MCELROY US EPA REGION 1
Doc Date: 01/09/2011 **# of Pages:** 1
Weston Number:
Doc Type: LETTER
CORRESPONDENCE
EMAIL
PRP OVERSIGHT LETTER

70000595 EMAIL COMMENTING ON THE OPERABLE UNIT 4 (OU 4) PROPOSED PLAN

Author: ELAINE SCHEPICI BILLERICA (MA) RESIDENT
Addressee: JOE SCHEPICI BILLERICA (MA) RESIDENT
DON MCELROY US EPA REGION 1
Doc Date: 01/09/2011 **# of Pages:** 1
Weston Number:
Doc Type: CORRESPONDENCE
EMAIL
PUBLIC (AND OTHER) COMMENTS

70000596 EMAIL COMMENTING ON THE OPERABLE UNIT 4 (OU 4) PROPOSED PLAN

Author: ELINOR A HENDEN BILLERICA (MA) RESIDENT
Addressee: DON MCELROY US EPA REGION 1
Doc Date: 01/09/2011 **# of Pages:** 1
Weston Number:
Doc Type: CORRESPONDENCE
PUBLIC (AND OTHER) COMMENTS
EMAIL

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70000597 EMAIL COMMENTING ON THE OPERABLE UNIT 4 (OU 4) PROPOSED PLAN

Author: PHILIP J NEWFELL BILLERICA (MA) RESIDENT
Addressee: DON MCELROY US EPA REGION 1
Doc Type: CORRESPONDENCE
EMAIL
PUBLIC (AND OTHER) COMMENTS

Doc Date: 01/09/2011 **# of Pages:** 1
Weston Number:

70000603 EMAIL COMMENTING ON THE OPERABLE UNIT 4 (OU 4) PROPOSED PLAN

Author: DANIEL J LOONEY JR BILLERICA (MA) RESIDENT
Addressee: DON MCELROY US EPA REGION 1
Doc Type: CORRESPONDENCE
PUBLIC (AND OTHER) COMMENTS
EMAIL

Doc Date: 01/12/2011 **# of Pages:** 1
Weston Number:

70000604 EMAIL TRANSMITTING COMMENTS ON THE OPERABLE UNIT 4 (OU 4) PROPOSED PLAN

Author: CAROLINE AHDAB NONE
Addressee: DON MCELROY US EPA REGION 1
Doc Type: CORRESPONDENCE
EMAIL
PUBLIC (AND OTHER) COMMENTS

Doc Date: 01/12/2011 **# of Pages:** 1
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70000605 EMAIL COMMENTING ON THE OPERABLE UNIT 4 (OU 4) PROPOSED PLAN

Author: SUSAN PAVIA BILLERICA (MA) RESIDENT
Addressee: DON MCELROY US EPA REGION 1
Doc Date: 01/12/2011 **# of Pages:** 1
Weston Number:
Doc Type: CORRESPONDENCE
EMAIL
PUBLIC (AND OTHER) COMMENTS

70000606 EMAIL COMMENTING ON THE OPERABLE UNIT 4 (OU 4) PROPOSED PLAN

Author: LEO MANNING NONE
Addressee: DON MCELROY US EPA REGION 1
Doc Date: 01/12/2011 **# of Pages:** 1
Weston Number:
Doc Type: CORRESPONDENCE
EMAIL
PUBLIC (AND OTHER) COMMENTS

70000607 EMAIL COMMENTING ON THE OPERABLE UNIT 4 (OU 4) PROPOSED PLAN

Author: KENNETH MCPHILLIPS BILLERICA (MA) RESIDENT
Addressee: DON MCELROY US EPA REGION 1
Doc Date: 01/12/2011 **# of Pages:** 1
Weston Number:
Doc Type: CORRESPONDENCE
EMAIL
PUBLIC (AND OTHER) COMMENTS

04: FEASIBILITY STUDY (FS)

File Break: **04.09**

70000608 EMAIL COMMENTING ON THE OPERABLE UNIT 4 (OU 4) PROPOSED PLAN

Author: NICK ROSA BILLERICA (MA) RESIDENT
Addressee: DON MCELROY US EPA REGION 1
Doc Date: 01/13/2011 **# of Pages:** 1
Weston Number:
Doc Type: CORRESPONDENCE
EMAIL
PUBLIC (AND OTHER) COMMENTS

70000609 EMAIL COMMENTING ON THE OPERABLE UNIT 4 (OU 4) PROPOSED PLAN

Author: ANDREW DESLAURIER BILLERICA (MA) BOARD OF SELECT
Addressee: DON MCELROY US EPA REGION 1
Doc Date: 01/13/2011 **# of Pages:** 1
Weston Number:
Doc Type: CORRESPONDENCE
PUBLIC (AND OTHER) COMMENTS
EMAIL

70000610 EMAIL COMMENTING ON THE OPERABLE UNIT 4 (OU 4) PROPOSED PLAN

Author: CHRISTINE TEIXEIRA BILLERICA (MA) RESIDENT
Addressee: DON MCELROY US EPA REGION 1
Doc Date: 01/13/2011 **# of Pages:** 1
Weston Number:
Doc Type: CORRESPONDENCE
EMAIL
PUBLIC (AND OTHER) COMMENTS

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70000611 EMAIL COMMENTING ON THE OPERABLE UNIT 4 (OU 4) PROPOSED PLAN

Author: JOANNE WHITE BILLERICA (MA) RESIDENT
Addressee: DON MCELROY US EPA REGION 1
Doc Type: CORRESPONDENCE
EMAIL
PUBLIC (AND OTHER) COMMENTS

Doc Date: 01/13/2011 **# of Pages:** 1
Weston Number:

70000612 EMAIL COMMENTING ON THE OPERABLE UNIT 4 (OU 4) PROPOSED PLAN

Author: CINDY LOMBARDI BILLERICA (MA) RESIDENT
Addressee: DON MCELROY US EPA REGION 1
Doc Type: CORRESPONDENCE
PUBLIC (AND OTHER) COMMENTS
EMAIL

Doc Date: 01/13/2011 **# of Pages:** 1
Weston Number:

70000613 EMAIL COMMENTING ON THE OPERABLE UNIT 4 (OU 4) PROPOSED PLAN

Author: CAROLINE AHDAB BILLERICA WATCHERS GROUP
Addressee: DON MCELROY US EPA REGION 1
Doc Type: CORRESPONDENCE
PUBLIC (AND OTHER) COMMENTS
EMAIL

Doc Date: 01/07/2011 **# of Pages:** 1
Weston Number:

04: FEASIBILITY STUDY (FS)

File Break: **04.09**

70000614 EMAIL COMMENTING ON THE OPERABLE UNIT 4 (OU 4) PROPOSED PLAN

Author: KRISTYN MITCHELL BILLERICA (MA) RESIDENT
Doc Date: 01/08/2011 **# of Pages:** 1
Addressee: DON MCELROY US EPA REGION 1
Weston Number:
Doc Type: CORRESPONDENCE
EMAIL
PUBLIC (AND OTHER) COMMENTS

70000615 EMAIL COMMENTING ON THE OPERABLE UNIT 4 (OU 4) PROPOSED PLAN

Author: CHRIS KINSELLA BILLERICA (MA) RESIDENT
Doc Date: 01/08/2011 **# of Pages:** 1
Addressee: DON MCELROY US EPA REGION 1
Weston Number:
Doc Type: CORRESPONDENCE
PUBLIC (AND OTHER) COMMENTS
EMAIL

70000616 EMAIL COMMENTING ON THE OPERABLE UNIT 4 (OU 4) PROPOSED PLAN

Author: DAVID A KINSELLA AIA BILLERICA (MA) RESIDENT
Doc Date: 01/08/2011 **# of Pages:** 1
Addressee: DON MCELROY US EPA REGION 1
Weston Number:
Doc Type: CORRESPONDENCE
EMAIL
PUBLIC (AND OTHER) COMMENTS

04: FEASIBILITY STUDY (FS)

File Break: **04.09**

70000617 EMAIL COMMENTING ON THE OPERABLE UNIT 4 (OU 4) PROPOSED PLAN

Author: CLAUDIA J KINSELLA BILLERICA (MA) RESIDENT
Addressee: DON MCELROY US EPA REGION 1
Doc Date: 01/08/2011 **# of Pages:** 1
Weston Number:
Doc Type: CORRESPONDENCE
PUBLIC (AND OTHER) COMMENTS
EMAIL

70000618 EMAIL COMMENTING ON THE OPERABLE UNIT 4 (OU 4) PROPOSED PLAN

Author: REGINA BROWN BILLERICA (MA) RESIDENT
Addressee: DON MCELROY US EPA REGION 1
Doc Date: 01/08/2011 **# of Pages:** 1
Weston Number:
Doc Type: CORRESPONDENCE
EMAIL
PUBLIC (AND OTHER) COMMENTS

70000619 EMAIL COMMENTING ON THE OPERABLE UNIT 4 (OU 4) PROPOSED PLAN

Author: LAURIE ZORBA BILLERICA (MA) RESIDENT
Addressee: DON MCELROY US EPA REGION 1
Doc Date: 01/08/2011 **# of Pages:** 1
Weston Number:
Doc Type: CORRESPONDENCE
EMAIL
PUBLIC (AND OTHER) COMMENTS

04: FEASIBILITY STUDY (FS)

File Break: **04.09**

70000620 EMAIL COMMENTING ON THE OPERABLE UNIT 4 (OU 4) PROPOSED PLAN

Author: CAROLE LEGRO BILLERICA (MA) RESIDENT
Addressee: DON MCELROY US EPA REGION 1
Doc Type: CORRESPONDENCE
PUBLIC (AND OTHER) COMMENTS
EMAIL

Doc Date: 01/08/2011 **# of Pages:** 1
Weston Number:

70000621 EMAIL COMMENTING ON THE OPERABLE UNIT 4 (OU 4) PROPOSED PLAN

Author: ROBERT M CORRENTI BILLERICA (MA) RESIDENT
Addressee: DON MCELROY US EPA REGION 1
Doc Type: CORRESPONDENCE
EMAIL
PUBLIC (AND OTHER) COMMENTS

Doc Date: 01/08/2011 **# of Pages:** 1
Weston Number:

70000622 EMAIL COMMENTING ON THE OPERABLE UNIT 4 (OU 4) PROPOSED PLAN

Author: SANDRA DOHERTY BILLERICA (MA) RESIDENT
Addressee: DON MCELROY US EPA REGION 1
Doc Type: CORRESPONDENCE
PUBLIC (AND OTHER) COMMENTS
EMAIL

Doc Date: 01/08/2011 **# of Pages:** 1
Weston Number:

04: FEASIBILITY STUDY (FS)

File Break: **04.09**

70000623 EMAIL COMMENTING ON THE OPERABLE UNIT 4 (OU 40 PROPOSED PLAN

Author: FRANK URRO BILLERICA (MA) RESIDENT
Addressee: DON MCELROY US EPA REGION 1
Doc Date: 01/08/2011 **# of Pages:** 1
Weston Number:
Doc Type: CORRESPONDENCE
EMAIL
PUBLIC (AND OTHER) COMMENTS

70000624 EMAIL COMMENTING ON THE OPERABLE UNIT 4 (OU 4) PROPOSED PLAN

Author: RICHARD SILVA BILLERICA (MA) RESIDENT
Addressee: DON MCELROY US EPA REGION 1
Doc Date: 01/08/2011 **# of Pages:** 1
Weston Number:
Doc Type: CORRESPONDENCE
PUBLIC (AND OTHER) COMMENTS
EMAIL

70000625 EMAIL COMMENTING ON THE OPERABLE UNIT 4 (OU 4) PROPOSED PLAN

Author: KRISTEN URRO BILLERICA (MA) RESIDENT
Addressee: DON MCELROY US EPA REGION 1
Doc Date: 01/08/2011 **# of Pages:** 1
Weston Number:
Doc Type: CORRESPONDENCE
EMAIL
PUBLIC (AND OTHER) COMMENTS

04: FEASIBILITY STUDY (FS)

File Break: **04.09**

70000626 EMAIL COMMENTING ON THE OPERABLE UNIT 4 (OU 4) PROPOSED PLAN

Author: MARION GALINOS BILLERICA (MA) RESIDENT
Addressee: DON MCELROY US EPA REGION 1
Doc Date: 01/08/2011 **# of Pages:** 1
Weston Number:
Doc Type: CORRESPONDENCE
PUBLIC (AND OTHER) COMMENTS
EMAIL

70000627 EMAIL COMMENTING ON THE OPERABLE UNIT 4 (OU 4) PROPOSED PLAN

Author: THERESE TEDFORD BILLERICA (MA) RESIDENT
Addressee: DON MCELROY US EPA REGION 1
Doc Date: 01/08/2011 **# of Pages:** 1
Weston Number:
Doc Type: CORRESPONDENCE
PUBLIC (AND OTHER) COMMENTS
EMAIL

70000628 EMAIL COMMENTING ON THE OPERABLE UNIT 4 (OU 4) PROPOSED PLAN

Author: STEPHEN GALINOS BILLERICA (MA) RESIDENT
Addressee: DON MCELROY US EPA REGION 1
Doc Date: 01/08/2011 **# of Pages:** 1
Weston Number:
Doc Type: CORRESPONDENCE
PUBLIC (AND OTHER) COMMENTS
EMAIL

04: FEASIBILITY STUDY (FS)

File Break: **04.09**

70000629 LETTER COMMENTING ON THE SUPPLEMENTAL GROUNDWATER DATA EVALUATION REPORT AND THE OPERABLE UNIT 4 (OU 4) PROPOSED PLAN

Author: CAROLINE AHDAB BILLERICA WATCHERS GROUP
Doc Date: 01/12/2011 **# of Pages:** 3
Addressee: DON MCELROY US EPA REGION 1
Weston Number:
Doc Type: CORRESPONDENCE
LETTER
PUBLIC (AND OTHER) COMMENTS

70000632 EMAIL COMMENTING ON THE OPERABLE UNIT 4 (OU 4) PROPOSED PLAN

Author: KATIE MCNEILL BILLERICA (MA) RESIDENT
Doc Date: 01/13/2011 **# of Pages:** 1
Addressee: DON MCELROY US EPA REGION 1
Weston Number:
Doc Type: CORRESPONDENCE
EMAIL
PUBLIC (AND OTHER) COMMENTS

70000633 EMAIL COMMENTING ON THE OPERABLE UNIT 4 (OU 4) PROPOSED PLAN

Author: JOSEPH MCWHINNIE BILLERICA (MA) RESIDENT
Doc Date: 01/13/2011 **# of Pages:** 1
Addressee: DON MCELROY US EPA REGION 1
Weston Number:
Doc Type: CORRESPONDENCE
EMAIL
PUBLIC (AND OTHER) COMMENTS

04: FEASIBILITY STUDY (FS)

File Break: **04.09**

70000641 EMAIL COMMENTING ON THE OPERABLE UNIT 4 (OU 4) PROPOSED PLAN

Author: CLINTON J OBRIEN BILLERICA (MA) RESIDENT
Addressee: DON MCELROY US EPA REGION 1
Doc Date: 01/11/2011
# of Pages: 1
Weston Number:
Doc Type: CORRESPONDENCE
EMAIL
PUBLIC (AND OTHER) COMMENTS

70000642 EMAIL COMMENTING ON THE OPERABLE UNIT 4 (OU 4) PROPOSED PLAN

Author: CARLOS SANTOS BILLERICA (MA) RESIDENT
Addressee: DON MCELROY US EPA REGION 1
Doc Date: 01/11/2011
# of Pages: 1
Weston Number:
Doc Type: CORRESPONDENCE
PUBLIC (AND OTHER) COMMENTS
EMAIL

70000643 EMAIL COMMENTING ON THE OPERABLE UNIT 4 (OU 4) PROPOSED PLAN

Author: REBECCA CLARKE BILLERICA (MA) RESIDENT
Addressee: DON MCELROY US EPA REGION 1
Doc Date: 01/11/2011
# of Pages: 1
Weston Number:
Doc Type: CORRESPONDENCE
PUBLIC (AND OTHER) COMMENTS
EMAIL

04: FEASIBILITY STUDY (FS)

File Break: 04.09

70000644 EMAIL COMMENTING ON THE OPERABLE UNIT 4 (OU 4) PROPOSED PLAN

Author: COSMO CAVICCHIO BILLERICA (MA) RESIDENT
Addressee: DON MCELROY US EPA REGION 1
Doc Date: 01/12/2011 **# of Pages:** 1
Weston Number:
Doc Type: CORRESPONDENCE
PUBLIC (AND OTHER) COMMENTS
EMAIL

70000645 EMAIL COMMENTING ON THE OPERABLE UNIT 4 (OU 4) PROPOSED PLAN

Author: ELIZABETH GALLAGHER BILLERICA (MA) RESIDENT
Addressee: DON MCELROY US EPA REGION 1
Doc Date: 01/10/2011 **# of Pages:** 1
Weston Number:
Doc Type: CORRESPONDENCE
EMAIL
PUBLIC (AND OTHER) COMMENTS

70000646 EMAIL COMMENTING ON THE OPERABLE UNIT 4 (OU 4) PROPOSED PLAN

Author: EVELYN F BENNETT LOWELL (MA) RESIDENT
Addressee: DON MCELROY US EPA REGION 1
Doc Date: 01/11/2011 **# of Pages:** 1
Weston Number:
Doc Type: CORRESPONDENCE
PUBLIC (AND OTHER) COMMENTS
EMAIL

04: FEASIBILITY STUDY (FS)

File Break: **04.09**

70000647 EMAIL COMMENTING ON THE OPERABLE UNIT 4 (OU 4) PROPOSED PLAN

Author: DIANE JACQUES BILLERICA (MA) RESIDENT
Addressee: DON MCELROY US EPA REGION 1
Doc Date: 01/11/2011 **# of Pages:** 1
Weston Number:
Doc Type: CORRESPONDENCE
EMAIL
PUBLIC (AND OTHER) COMMENTS

70000648 EMAIL COMMENTING ON THE OPERABLE UNIT 4 (OU 4) PROPOSED PLAN

Author: DON MCELROY US EPA REGION 1
Addressee:
Doc Date: 01/11/2011 **# of Pages:** 1
Weston Number:
Doc Type: CORRESPONDENCE
EMAIL
PUBLIC (AND OTHER) COMMENTS

70000649 EMAIL COMMENTING ON THE OPERABLE UNIT 4 (OU 4) PROPOSED PLAN

Author: DR LEVON CHORBAJIAN BILLERICA (MA) RESIDENT
Addressee: DON MCELROY US EPA REGION 1
Doc Date: 01/11/2011 **# of Pages:** 1
Weston Number:
Doc Type: CORRESPONDENCE
PUBLIC (AND OTHER) COMMENTS
EMAIL

04: FEASIBILITY STUDY (FS)

File Break: **04.09**

70000650 EMAIL COMMENTING ON THE OPERABLE UNIT 4 (OU 4) PROPOSED PLAN

Author: GERALD GOSS BILLERICA (MA) RESIDENT
Addressee: DON MCELROY US EPA REGION 1
Doc Date: 01/11/2011 **# of Pages:** 1
Weston Number:
Doc Type: CORRESPONDENCE
PUBLIC (AND OTHER) COMMENTS
EMAIL

70000651 EMAIL COMMENTING ON THE OPERABLE UNIT 4 (OU 4) PROPOSED PLAN

Author: GAYLE P STAFFIERE BILLERICA (MA) RESIDENT
Addressee: DON MCELROY US EPA REGION 1
Doc Date: 01/12/2011 **# of Pages:** 1
Weston Number:
Doc Type: CORRESPONDENCE
PUBLIC (AND OTHER) COMMENTS
EMAIL

70000652 EMAIL COMMENTING ON THE OPERABLE UNIT 4 (OU 4) PROPOSED PLAN

Author: DAVID A MACKWELL BILLERICA (MA) RESIDENT
Addressee: DON MCELROY US EPA REGION 1
Doc Date: 01/12/2011 **# of Pages:** 1
Weston Number:
Doc Type: CORRESPONDENCE
EMAIL
PUBLIC (AND OTHER) COMMENTS

04: FEASIBILITY STUDY (FS)

File Break: **04.09**

70000653 EMAIL COMMENTING ON THE OPERABLE UNIT 4 (OU 4) PROPOSED PLAN

Author: JAMES P HAINES BILLERICA (MA) RESIDENT
Addressee: DON MCELROY US EPA REGION 1
Doc Type: CORRESPONDENCE
PUBLIC (AND OTHER) COMMENTS
EMAIL

Doc Date: 01/10/2011 **# of Pages:** 1
Weston Number:

70000654 EMAIL COMMENTING ON THE OPERABLE UNIT 4 (OU 4) PROPOSED PLAN

Author: GERALDINE FOSKITT BILLERICA (MA) RESIDENT
Addressee: DON MCELROY US EPA REGION 1
Doc Type: CORRESPONDENCE
PUBLIC (AND OTHER) COMMENTS
EMAIL

Doc Date: 01/11/2011 **# of Pages:** 1
Weston Number:

70000655 EMAIL COMMENTING ON THE OPERABLE UNIT 4 (OU 4) PROPOSED PLAN

Author: HELENA PSETSKY BILLERICA (MA) RESIDENT
Addressee: DON MCELROY US EPA REGION 1
Doc Type: CORRESPONDENCE
PUBLIC (AND OTHER) COMMENTS
EMAIL

Doc Date: 01/11/2011 **# of Pages:** 1
Weston Number:

04: FEASIBILITY STUDY (FS)

File Break: **04.09**

70000656 EMAIL COMMENTING ON THE OPERABLE UNIT 4 (OU 4) PROPOSED PLAN

Author: JAMES CARON BILLERICA (MA) RESIDENT
Addressee: DON MCELROY US EPA REGION 1
Doc Date: 01/12/2011 **# of Pages:** 1
Weston Number:
Doc Type: CORRESPONDENCE
EMAIL
PUBLIC (AND OTHER) COMMENTS

70000657 EMAIL COMMENTING ON THE OPERABLE UNIT 4 (OU 4) PROPOSED PLAN

Author: JASON BARBARO BILLERICA (MA) RESIDENT
Addressee: DON MCELROY US EPA REGION 1
Doc Date: 01/12/2011 **# of Pages:** 1
Weston Number:
Doc Type: CORRESPONDENCE
PUBLIC (AND OTHER) COMMENTS
EMAIL

70000658 EMAIL COMMENTING ON THE OPERABLE UNIT 4 (OU 4) PROPOSED PLAN

Author: JAIME LYN SCHEPICI BILLERICA (MA) RESIDENT
Addressee: DON MCELROY US EPA REGION 1
Doc Date: 01/12/2011 **# of Pages:** 1
Weston Number:
Doc Type: CORRESPONDENCE
PUBLIC (AND OTHER) COMMENTS
EMAIL

04: FEASIBILITY STUDY (FS)

File Break: **04.09**

70000659 EMAIL COMMENTING ON THE OPERABLE UNIT 4 (OU 4) PROPOSED PLAN

Author: KARYN SILVA TEWKSBURY (MA) RESIDENT
Addressee: DON MCELROY US EPA REGION 1
Doc Date: 01/09/2011 **# of Pages:** 1
Weston Number:
Doc Type: CORRESPONDENCE
PUBLIC (AND OTHER) COMMENTS
EMAIL

70000660 EMAIL COMMENTING ON THE OPERABLE UNIT 4 (OU 4) PROPOSED PLAN

Author: KAREN MCCLUNG BILLERICA (MA) RESIDENT
Addressee: DON MCELROY US EPA REGION 1
Doc Date: 01/10/2011 **# of Pages:** 1
Weston Number:
Doc Type: CORRESPONDENCE
PUBLIC (AND OTHER) COMMENTS
EMAIL

70000661 EMAIL COMMENTING ON THE OPERABLE UNIT 4 (OU 4) PROPOSED PLAN

Author: MARC LOMBARDO BILLERICA (MA) RESIDENT
Addressee: DON MCELROY US EPA REGION 1
Doc Date: 01/10/2011 **# of Pages:** 1
Weston Number:
Doc Type: CORRESPONDENCE
PUBLIC (AND OTHER) COMMENTS
EMAIL

04: FEASIBILITY STUDY (FS)

File Break: **04.09**

70000662 EMAIL COMMENTING ON THE OPERABLE UNIT 4 (OU 4) PROPOSED PLAN

Author: LYNNE SANTOS BILLERICA (MA) RESIDENT
Addressee: DON MCELROY US EPA REGION 1
Doc Date: 01/11/2011 **# of Pages:** 1
Weston Number:
Doc Type: CORRESPONDENCE
EMAIL
PUBLIC (AND OTHER) COMMENTS

70000663 EMAIL COMMENTING ON THE OPERABLE UNIT 4 (OU 4) PROPOSED PLAN

Author: K SCHEPICI BILLERICA (MA) RESIDENT
Addressee: DON MCELROY US EPA REGION 1
Doc Date: 01/12/2011 **# of Pages:** 1
Weston Number:
Doc Type: CORRESPONDENCE
EMAIL
PUBLIC (AND OTHER) COMMENTS

70000664 EMAIL COMMENTING ON THE OPERABLE UNIT 4 (OU 4) PROPOSED PLAN

Author: MICHELLE KIRSTEIN BILLERICA (MA) RESIDENT
Addressee: DON MCELROY US EPA REGION 1
Doc Date: 01/09/2011 **# of Pages:** 1
Weston Number:
Doc Type: CORRESPONDENCE
EMAIL
PUBLIC (AND OTHER) COMMENTS

04: FEASIBILITY STUDY (FS)

File Break: **04.09**

70000665 EMAIL COMMENTING ON THE OPERABLE UNIT 4 (OU 4) PROPOSED PLAN

Author: DON MCELROY US EPA REGION 1
Doc Date: 01/09/2011 **# of Pages:** 1
Addressee:
Weston Number:
Doc Type: CORRESPONDENCE
EMAIL
PUBLIC (AND OTHER) COMMENTS

70000666 EMAIL COMMENTING ON THE OPERABLE UNIT 4 (OU 4) PROPOSED PLAN

Author: MARY M ROGERS BILLERICA (MA) RESIDENT
Doc Date: 01/10/2011 **# of Pages:** 1
Addressee: DON MCELROY US EPA REGION 1
Weston Number:
Doc Type: CORRESPONDENCE
PUBLIC (AND OTHER) COMMENTS
EMAIL

70000667 EMAIL COMMENTING ON THE OPERABLE UNIT 4 (OU 4) PROPOSED PLAN

Author: MELISSA LOMBARDO BILLERICA (MA) RESIDENT
Doc Date: 01/10/2011 **# of Pages:** 1
Addressee: DON MCELROY US EPA REGION 1
Weston Number:
Doc Type: CORRESPONDENCE
EMAIL
PUBLIC (AND OTHER) COMMENTS

04: FEASIBILITY STUDY (FS)

File Break: **04.09**

70000668 EMAIL COMMENTING ON THE OPERABL EUNIT 4 (OU 4) PROPOSED PLAN

Author: PETER DUBOIS BILLERICA (MA) RESIDENT
Addressee: DON MCELROY US EPA REGION 1
Doc Type: CORRESPONDENCE
PUBLIC (AND OTHER) COMMENTS
EMAIL

Doc Date: 01/11/2011 **# of Pages:** 1
Weston Number:

70000669 EMAIL COMMENTING ON THE OPERABLE UNIT 4 (OU 4) PROPOSED PLAN

Author: MICHELLE BARBARO BILLERICA (MA) RESIDENT
Addressee:
Doc Type: CORRESPONDENCE
EMAIL
PUBLIC (AND OTHER) COMMENTS

Doc Date: 01/12/2011 **# of Pages:** 1
Weston Number:

70000670 EMAIL COMMENTING ON THE OPERABLE UNIT 4 (OU 4) PROPOSED PLAN

Author: PHILIP MENDONCA OLIVEREIRA BILLERICA (MA) RESIDEN
Addressee: DON MCELROY US EPA REGION 1
Doc Type: CORRESPONDENCE
PUBLIC (AND OTHER) COMMENTS
EMAIL

Doc Date: 01/12/2011 **# of Pages:** 1
Weston Number:

04: FEASIBILITY STUDY (FS)

File Break: 04.09

70000671 EMAIL COMMENTING ON THE OPERABLE UNIT 4 (OU 4) PROPOSED PLAN

Author: RICHARD TORTOLA BILLERICA (MA) RESIDENT
Addressee: DON MCELROY US EPA REGION 1
Doc Type: CORRESPONDENCE
EMAIL
PUBLIC (AND OTHER) COMMENTS

Doc Date: 01/10/2011 **# of Pages:** 1
Weston Number:

70000672 EMAIL COMMENTING ON THE OPERABLE UNIT 4 (OU 4) PROPOSED PLAN

Author: SCOTT MORRIS BILLERICA (MA) RESIDENT
Addressee: DON MCELROY US EPA REGION 1
Doc Type: CORRESPONDENCE
EMAIL
PUBLIC (AND OTHER) COMMENTS

Doc Date: 01/10/2011 **# of Pages:** 1
Weston Number:

70000673 EMAIL COMMENTING ON THE OPERABLE UNIT 4 (OU 4) PROPOSED PLAN

Author: REBECCA CLARKE BILLERICA (MA) RESIDENT
Addressee: DON MCELROY US EPA REGION 1
Doc Type: CORRESPONDENCE
EMAIL
PUBLIC (AND OTHER) COMMENTS

Doc Date: 01/11/2011 **# of Pages:** 1
Weston Number:

04: FEASIBILITY STUDY (FS)

File Break: 04.09

70000674 EMAIL COMMENTING ON THE OPERABLE UNIT 4 (OU 4) PROPOSED PLAN

Author: SANDRA RHYND BILLERICA (MA) RESIDENT
Addressee: DON MCELROY US EPA REGION 1
Doc Date: 01/12/2011 **# of Pages:** 1
Weston Number:
Doc Type: CORRESPONDENCE
EMAIL
PUBLIC (AND OTHER) COMMENTS

70000675 EMAIL COMMENTING ON THE OPERABLE UNIT 4 (OU 4) PROPOSED PLAN

Author: SUSAN OBRIEN BILLERICA (MA) RESIDENT
Addressee: DON MCELROY US EPA REGION 1
Doc Date: 01/12/2011 **# of Pages:** 1
Weston Number:
Doc Type: CORRESPONDENCE
PUBLIC (AND OTHER) COMMENTS
EMAIL

05: RECORD OF DECISION (ROD)

File Break: 05.04

489545 RECORD OF DECISION (ROD) FOR OPERABLE UNIT (OU) 4 SITE-WIDE SEDIMENT/GROUNDWATER

Author:
US EPA REGION 1
Addressee:
Doc Date: 07/25/2011 **# of Pages:** 220
Weston Number:
Doc Type: RECORD OF DECISION (ROD)
REPORT
DECISION DOCUMENT

05: RECORD OF DECISION (ROD)

File Break: **05.04**

489546 STATE CONCURRENCE LETTER FOR RECORD OF DECISION (ROD) OPERABLE UNIT (OU) 4 SITE-WIDE SEDIMENT/GROUNDWATER

Author: PAUL LOCKE MA DEPT OF ENVIRONMENTAL PROTECTION
Addressee: JAMES T OWENS US EPA REGION 1
Doc Type: LETTER
CORRESPONDENCE
Doc Date: 07/22/2011 **# of Pages:** 2
Weston Number:

13: COMMUNITY RELATIONS

File Break: **13.04**

473685 PRESENTATION FOR THE PUBLIC INFORMATION MEETING FOR THE OPERABLE UNIT (OU) 4 PROPOSED CLEANUP PLAN, SITE GROUNDWATER AND SEDIMENT

Author:
US EPA REGION 1
Addressee:
Doc Type: PUBLIC INFORMATION
MEETING RECORD
Doc Date: 10/24/2010 **# of Pages:** 30
Weston Number:

482415 TRANSCRIPT OF PUBLIC HEARING ON THE PROPOSED PLAN FOR OPERABLE UNIT 4 (OU 4)

Author:
US EPA REGION 10
Addressee:
Doc Type: MEETING RECORD
PUBLIC INFORMATION
Doc Date: 11/10/2010 **# of Pages:** 29
Weston Number:

Number of Documents in Administrative Record: 150

EPA Region 1 AR Compendium GUIDANCE DOCUMENTS

EPA guidance documents may be reviewed at the EPA Region 1 OSRR Records and Information Center in Boston, Massachusetts.

TITLE	DOCDATE	OSWEREPAID	DOCNUMBER
CONTAMINATED SEDIMENT REMEDIATION GUIDANCE FOR HAZARDOUS WASTE SITES	01-Dec-05	EPA-540-R-05-012	C629
SUMMARY OF KEY EXISTING EPA CERCLA POLICIES FOR GROUNDWATER RESTORATION	26-Jun-09	OSWER 9283.1-33	C741